TSWSF 1.6.2 V1

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Report

Remedial Investigation/ Risk Assessment/ Feasibility Study

Former Brass Foundry Area
South Tacoma Swamp
Tacoma, Washington

Volume 2

Amsted Industries, Inc.
Chicago, Illinois

K/J/C 6733
January 1987

1.62

Kennedy/Jenks/Chilton

APPENDIX A

GEOENGINEERS' HYDROGEOLOGICAL REPORT

REPORT OF HYDROGEOLOGIC SERVICES
FORMER GRIFFIN WHEEL BRASS FOUNDRY
TACOMA INDUSTRIAL PROPERTIES
TACOMA, WASHINGTON
FOR
KENNEDY/JENKS/CHILTON

GeoEngineers
Incorporated

GeoEngineers Incorporated

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Bellevue, WA 98005

Consulting Geotechnical
Engineers and Geologists

November 17, 1986

Kennedy/Jenks/Chilton
33301 Ninth Avenue South
Federal Way, Washington 98003

Attention: Mr. Nathan Graves

Gentlemen:

We are submitting six copies of our hydrogeologic report for the Tacoma Industrial Properties site in Tacoma, Washington. Our services were authorized under the terms of the subconsultant agreement with your firm that was signed by Mr. Donald Graf on September 30, 1986.

We appreciate the opportunity to be of service to Kennedy/Jenks/Chilton on this assignment. Please contact us if there are any questions regarding our report.

Yours very truly,

GeoEngineers, Inc.

James A. Miller

James A. Miller
Associate

JAM:cs

File No. 1039-01

T A B L E   O F   C O N T E N T S

REPORT OF HYDROGEOLOGIC SERVICES
FORMER GRIFFIN WHEEL BRASS FOUNDRY
TACOMA INDUSTRIAL PROPERTIES
TACOMA, WASHINGTON

INTRODUCTION AND SCOPE

The results of our hydrogeologic services at the former Griffin Wheel brass foundry are presented in this report. We understand that the Griffin Wheel site is owned by Tacoma Industrial Properties (TIP). The former foundry is located west of Proctor Street, east of Madison Street, and approximately 1000 feet north of South 56th Street. The site location is shown in Figure 1.

The purpose of our services is to develop site-specific geologic and hydrologic information to assist Kennedy/Jenks/Chilton in their evaluation of surface and subsurface contamination at the site. Specifically, our scope of services includes:

1. Drilling and installing four ground water monitor wells in the vicinity of the former foundry, at locations approved by Kennedy/Jenks/Chilton and TIP.
2. Obtaining soil samples from the borings for examination and analytical testing by Kennedy/Jenks/Chilton.
3. Determining well casing elevations for the new monitor wells and three existing EPA wells.
4. Measuring water table elevations in each of the seven monitor wells listed above as a basis for determining the ground water flow direction for the water table aquifer.
5. Obtaining water samples from the seven monitor wells for analytical testing by Kennedy/Jenks/Chilton and the EPA.
6. Researching and describing hydrogeologic conditions in the vicinity of the Griffin Wheel site.

HYDROGEOLOGIC SETTING

The TIP site is located on the floor of an erosional channel that was occupied by a major glacial meltwater stream during the waning stages of the last glaciation of this region, approximately 13,000 years ago. This

4-mile-long meltwater valley is locally referred to as the "South Tacoma Channel." The channel is incised as much as 150 feet below the rolling upland area that is occupied by residential and commercial districts of Tacoma. The channel extends north and east of the TIP site to the vicinity of the intersection of South Tacoma Way and Yakima Avenue. South of the study area, the glacial channel widens and opens into a broad glacial outwash plain that is underlain by highly permeable gravel.

The "South Tacoma Swamp" is located immediately north and west of the TIP site. This lowlying portion of the valley floor has been partly filled and drained.

No creeks or streams are present in the vicinity of the TIP property. The headwater area of Flett Creek is present approximately 6000 feet south of the TIP site. Flett Creek drains into Chambers Creek and then into Puget Sound.

The Tacoma-Pierce County Health Department has completed a regional geohydrologic study of the Clover/Chambers Creek drainage basin. The results of that study are included in a July 1985 report prepared by Brown and Caldwell entitled "Clover/Chambers Creek Geohydrologic Study." The Brown and Caldwell report indicates that the TIP site is located in an area where potential contamination of shallow and deep aquifers is possible. The report also indicates a ground water flow direction that is generally westward in the vicinity of the TIP site.

LOCAL WATER WELLS

Numerous water wells have been drilled in and near the South Tacoma Channel. We researched the well logs on file at the Tacoma-Pierce County Health Department to determine the approximate location and capacity of wells within one mile of the TIP site.

The City of Tacoma owns several municipal wells in a well field located 3000 to 7000 feet north-northeast of the TIP site. Some of these wells are capable of yields in excess of 3000 gpm. This well field does not appear to be downgradient of the TIP site.

The Town of Fircrest owns three municipal wells located 8000 to 10,000 feet northwest of the TIP site. Based on information presented in the Brown and Caldwell report, these wells are not located downgradient from the TIP site.

The University Place Water Company owns three public supply wells located approximately 8000 feet northwest of the TIP site. These wells do not appear to be located downgradient from the TIP site.

Based on available well records, the closest potential downgradient well is located approximately 2500 feet west of the TIP site. This private well at 5402 South Mullen Street is 110 feet deep and has a high reported iron content.

SITE CONDITIONS

SURFACE DESCRIPTION

Tacoma Industrial Properties owns approximately 17 acres of property between Madison Street and Burlington Way. Our investigation was limited to a 2.5-acre parcel formerly owned by the Griffin Wheel Foundry.

The foundry site is occupied by an abandoned two-story brick office building and a vacant wood frame foundry building. Most of the ground surface adjacent to the foundry building is covered with black to dark green "slag." Cinder debris and slag are exposed along the face of a 10-foot slope between the foundry and Madison Street. Ground cover in the vicinity of the two buildings includes a maintained lawn, blackberry bushes, dense underbrush, trees and bare ground. Ground surface elevations range from 235 to 250 feet above sea level.

SUBSURFACE SOIL CONDITIONS

Subsurface soil conditions beneath the site were explored by drilling four borings at the approximate locations shown in Figure 2. Details of the field exploration program are given in Appendix A.

The borings encountered silty fine sand overlying gravelly sand. The silty fine sand extends from the surface to a depth of approximately 7 feet at the boring locations. The gravelly sand unit was deposited by glacial meltwater during formation of the South Tacoma Channel. The base of the gravelly sand unit was not reached in the borings.

SITE GROUND WATER CONDITIONS

Ground water conditions at the site were explored by installing a permanent monitor well in each boring. Construction details for the wells are included in Appendix A. Information regarding ground water conditions in and near the Griffin Wheel site was supplemented by measuring and sampling three existing monitor wells installed by the EPA in 1983. We determined the water table elevation in each monitor well on September 26, 1986.

The water table at the site ranged from 18 to 32 feet below ground surface in September. Ground water occurs in an unconfined condition within the gravelly sand unit encountered in the monitor well borings. Contours of the water table for September 26 field data are shown in Figure 2. Based on water table contours, the ground water flow direction beneath the site is generally northwesterly.

UNDERGROUND TANKS

The presence of soil contamination by hydrocarbons was noted in Boring MW-2, which is located in proximity to two buried fuel tanks. No free (floating) hydrocarbons were found on the water table in Well MW-2 in September.

We discovered a third underground tank along the west wall of the office building, approximately 25 feet east of Boring MW-1. Well MW-1 showed no signs of visible hydrocarbon contamination.

LIMITATIONS

We have prepared this report for use by Tacoma Industrial Properties; Kennedy/Jenks/Chilton; and other organizations as authorized by Tacoma Industrial Properties. The information contained in this report pertains to the evaluation of subsurface contamination on the parcel of property at 5202 South Proctor Street. This report is not intended for other uses and the information presented may not be applicable to other sites.

Our interpretations of subsurface conditions are based on data from widely spaced boreholes at the site. It is possible that areas with undetected contamination may exist in areas of the site that were not explored by drilling.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in this area at the time the report was prepared. No other conditions, express or implied, should be understood.

- o O o -

Please contact us if you have any questions regarding this report.

Respectfully submitted,

GeoEngineers, Inc.

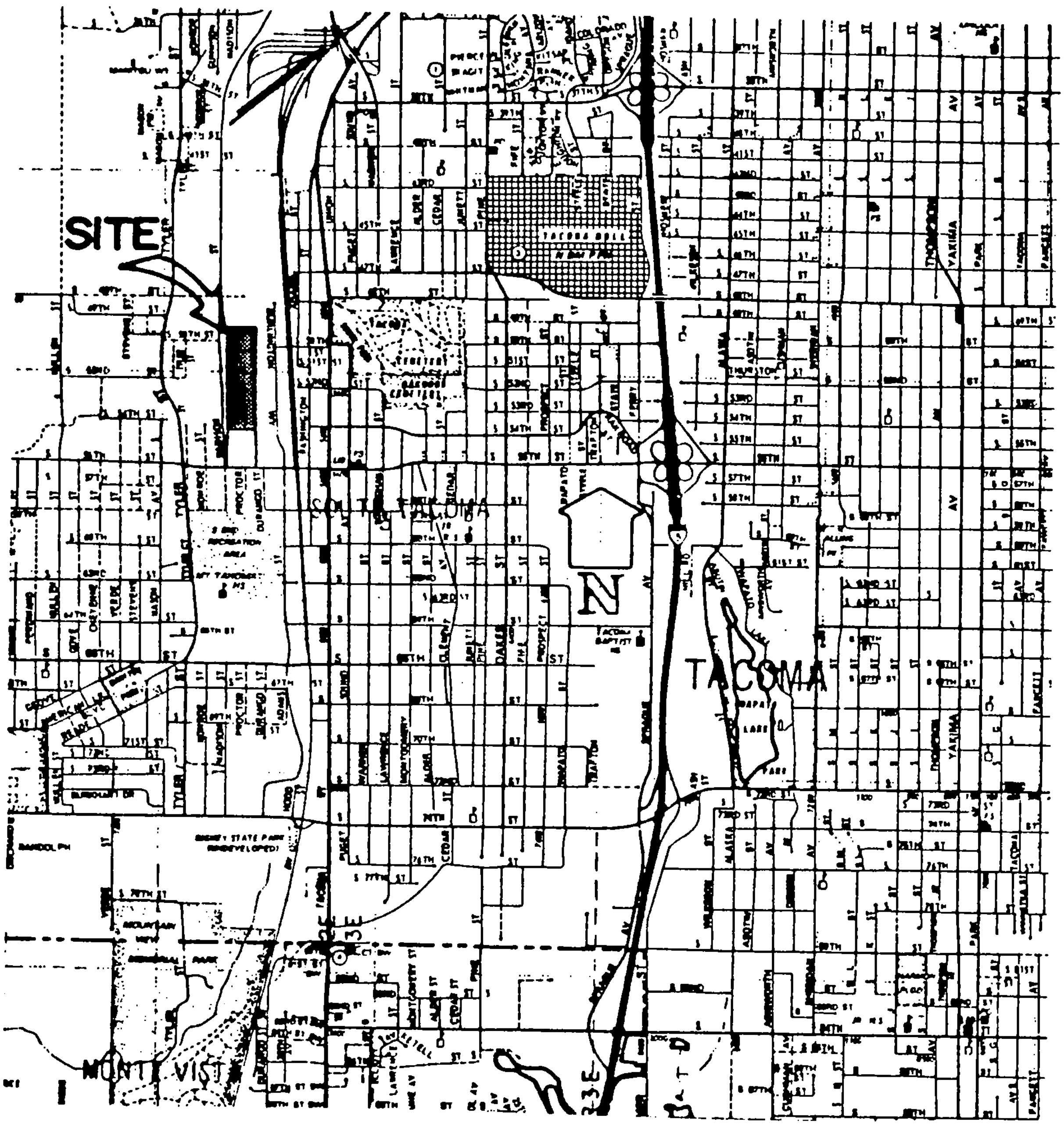
Scott E. Widness/by JAm

Scott E. Widness
Geological Engineer

James A. Miller

James A. Miller
Associate

SEW:JAM:cs



Not to Scale

Kennedy/Jenks/Chilton

TIP Management Inc.
Tacoma, Washington

Location Map

K/J/C 6733

January 1987

Figure 1

APPENDIX A

FIELD EXPLORATIONS

DRILLING AND SOIL SAMPLING PROGRAM

Subsurface conditions at Tacoma Industrial Properties were explored by drilling four borings at the approximate locations indicated in Figure 2. The borings were drilled between September 15 and 17, 1986 to depths ranging from 31.0 to 44.5 feet using truck-mounted, hollow-stem auger drilling equipment owned and operated by FLD Industries. The soil sampling equipment was cleaned with a pressure washer between each sampling attempt. The drilling equipment was cleaned in the same manner between each boring.

A geological engineer from our staff determined the boring locations, examined and classified the soils encountered, and prepared a detailed log of each boring. Soils encountered were classified visually in general accordance with ASTM D-2487-83, which is described in Figure A-1. An explanation of the boring log symbols is presented in Figure A-2. The boring logs are given in Figures A-3 through A-6.

Relatively undisturbed soil samples were obtained from each boring using a 2-inch-diameter split-spoon sampler (1.5-inch ID). the sampler was driven 18 inches by a 140-pound weight falling a vertical distance of 30 inches. The number of blows needed to advance the sampler the final 12 inches is indicated to the left of the corresponding sample notations on the boring logs. A surface grab sample was also obtained at each drill site.

All soil samples obtained at the site were retained by Kennedy/Jenks/Chilton. Chemical analyses were done on selected samples. Those samples for which chemical testing was done are labeled with a "CA" on the monitor well logs.

MONITOR WELL CONSTRUCTION

Two-inch-diameter, Schedule 40 PVC pipe was installed in each boring at the completion of drilling. The lower portion of the PVC pipe is machine slotted (0.02-inch slot width) to allow entry of water into the well casings.

Medium silica sand was placed in the borehole annulus surrounding the slotted portion of the wells. The remainder of the annular space was filled with a bentonite/native soil mix. Monitor well construction is indicated in Figures A-3 through A-6.

The monitor wells were developed on September 18, 1986 by removing water from the wells with a stainless steel bailer. We determined the elevations of the well casings to the nearest 0.01 foot with an engineer's level on September 18, 1986. An elevation datum of 239.28 feet was used for the top of the steel casing over CBS-05. Elevations referenced to this datum are included on the monitor well logs.

GROUND WATER SAMPLING PROGRAM

Ground water samples were collected from all seven monitor wells by GeoEngineers and Kennedy/Jenks/Chilton September 26, 1986. The water samples were collected with a stainless steel bailer after a minimum of three well volumes of water was removed from each well casing. The water samples were transferred to septum vials in the field and kept cool during transport to the testing laboratory.

The bailer was cleaned prior to each sampling attempt with a fresh water rinse, tri-sodium phosphate wash, and a second fresh water rinse which was followed by a distilled water rinse.

Representatives from the Washington State Department of Ecology and the U.S. Environmental Protection Agency were present during our sampling of the three previously installed EPA monitor wells. Access to these wells was provided by the EPA.

GROUND WATER ELEVATIONS

The depth to the ground water table relative to the monitor well casing rims was measured on September 26, 1986. The site measurements were made using an electric water level indicator. Ground water elevations were calculated by subtracting the water table depth from the casing rim elevations. Water table positions measured on September 26, 1986 are shown on the monitor well logs.

SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOL	GROUP NAME
COARSE GRAINED SOILS MORE THAN 50% RETAINED ON NO. 200 SIEVE	GRAVEL MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVEL	GW	WELL-GRADED GRAVEL, FINE TO COARSE GRAVEL
			GP	POORLY-GRADED GRAVEL
		GRAVEL WITH FINES	GM	SILTY GRAVEL
			GC	CLAYEY GRAVEL
	SAND MORE THAN 50% OF COARSE FRACTION PASSES NO. 4 SIEVE	CLEAN SAND	SW	WELL-GRADED SAND, FINE TO COARSE SAND
			SP	POORLY-GRADED SAND
		SAND WITH FINES	SM	SILTY SAND
			SC	CLAYEY SAND
FINE GRAINED SOILS MORE THAN 50% PASSES NO. 200 SIEVE	SILT AND CLAY LIQUID LIMIT LESS THAN 50	INORGANIC	ML	SILT
			CL	CLAY
		ORGANIC	OL	ORGANIC SILT, ORGANIC CLAY
	SILT AND CLAY LIQUID LIMIT 50 OR MORE	INORGANIC	MH	SILT OF HIGH PLASTICITY, ELASTIC SILT
			CH	CLAY OF HIGH PLASTICITY, FAT CLAY
		ORGANIC	OH	ORGANIC CLAY, ORGANIC SILT
HIGHLY ORGANIC SOILS			PT	PEAT

NOTES:

1. Field classification is based on visual examination of soil in general accordance with ASTM D2488-83.
2. Soil classification using laboratory tests is based on ASTM D2487-83.
3. Descriptions of soil density or consistency are based on interpretation of blowcount data, visual appearance of soils, and/or test data.

SOIL MOISTURE MODIFIERS:

Dry – Absence of moisture, dusty, dry to the touch

Moist – Damp, but no visible water

Wet – Visible free water or saturated, usually soil is obtained from below water table

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GEI 85-85

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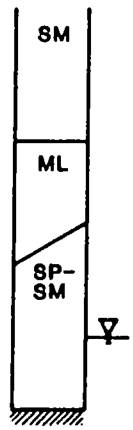
SOIL CLASSIFICATION SYSTEM

FIGURE A-1

LABORATORY TESTS:

AL	Atterberg limits
CP	Compaction
CS	Consolidation
DS	Direct shear
GS	Grain-size analysis
HA	Hydrometer analysis
K	Permeability
M	Moisture content
MD	Moisture and density
SP	Swelling pressure
TX	Triaxial compression
UC	Unconfined compression

SOIL GRAPH:



Soil Group Symbol (See Note 1)

Distinct contact between Soil Strata

Gradual Change between Soil Strata

Water Level

Bottom of Boring

BLOW-COUNT/SAMPLE DATA:

Blows required to drive sampler 12 inches or other indicated distances using 140 pound hammer falling 30 inches.

"P" indicates sampler pushed with weight of hammer or hydraulics of drill rig.

22 ■	Location of relatively undisturbed sample
12 ⊠	Location of disturbed sample
P □	Location of sampling attempt with no recovery
10 ◪	Location of sample attempt using Standard Penetration Test procedures

NOTES:

1. Soil classification system is summarized in Figure A-1.
2. The reader must refer to the discussion in the report text as well as the exploration logs for a proper understanding of subsurface conditions.

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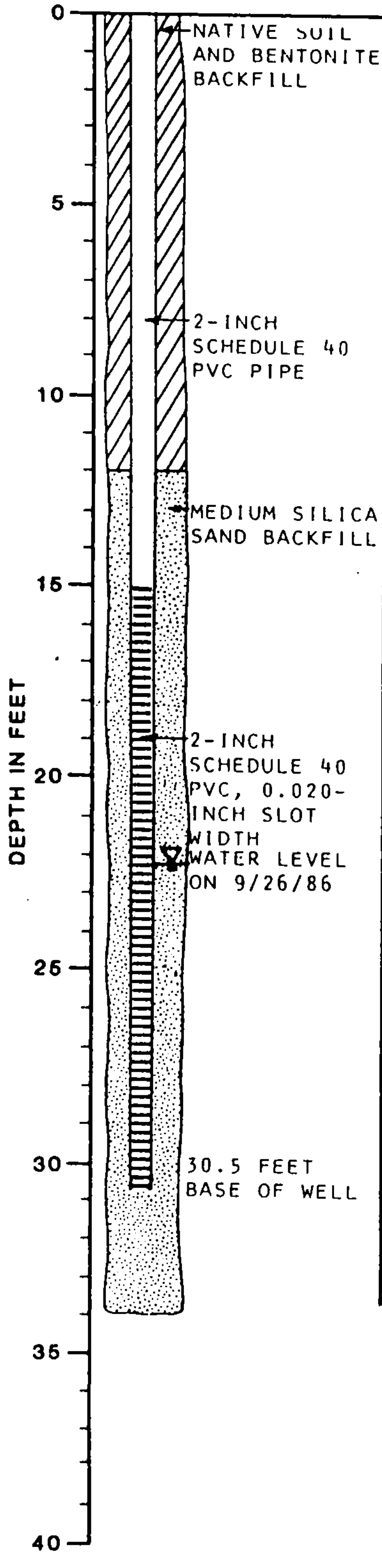
KEY TO BORING LOG SYMBOLS

FIGURE A-2

MONITOR WELL NO. MW-1

WELL SCHEMATIC
Casing Elevation: 243.04
Casing Stickup: 3.0

Surface Elevation: 240.0



Blow-Count	Samples	Group Symbol	DESCRIPTION
	CA	SM	BROWN SILTY FINE SAND (MEDIUM DENSE, DAMP)
12	CA		
33		SP	REDDISH-BROWN FINE TO MEDIUM SAND WITH SILT (DENSE, DAMP)
		SW	BROWN FINE TO COARSE SAND WITH A TRACE OF GRAVEL (DENSE, MOIST)
51			
48			
			GRADES TO GRAY IN COLOR
76/9"	CA		
		SP	GRAY FINE TO MEDIUM SAND WITH A TRACE OF SILT (DENSE, WET)
50/4"			
50/5"	CA		
			BORING COMPLETED AT 34.0 FEET ON 9/15/86

Note: See Figure A-2 for Explanation of Symbols

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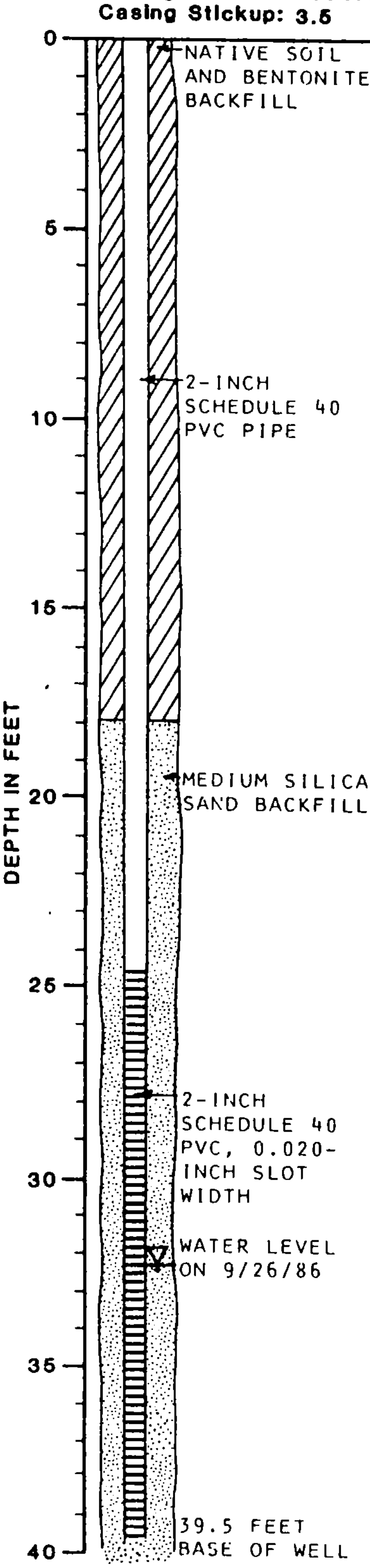
LOG OF MONITOR WELL

FIGURE A-3

MONITOR WELL NO. MW-2

WELL SCHEMATIC
Casing Elevation: 253.63
Casing Stickup: 3.5

DESCRIPTION
Surface Elevation: 250.1



Blow-Count	Samples
	CA
10	CA
19	
86	
75	
68	CA
44	
45	
50/4"	

Group Symbol	Description
SM	DARK GRAY SILTY FINE SAND WITH A TRACE OF GRAVEL (MEDIUM DENSE, DAMP) (FILL)
SW	BROWN FINE TO COARSE SAND WITH A TRACE OF GRAVEL (VERY DENSE, DAMP)
	GRADES TO GRAY IN COLOR MODERATE HYDROCARBON ODOR AND VISIBLE CONTAMINATION AT 23.5 FEET
SP	GRAY FINE TO MEDIUM SAND WITH A TRACE OF SILT (DENSE, MOIST TO WET)

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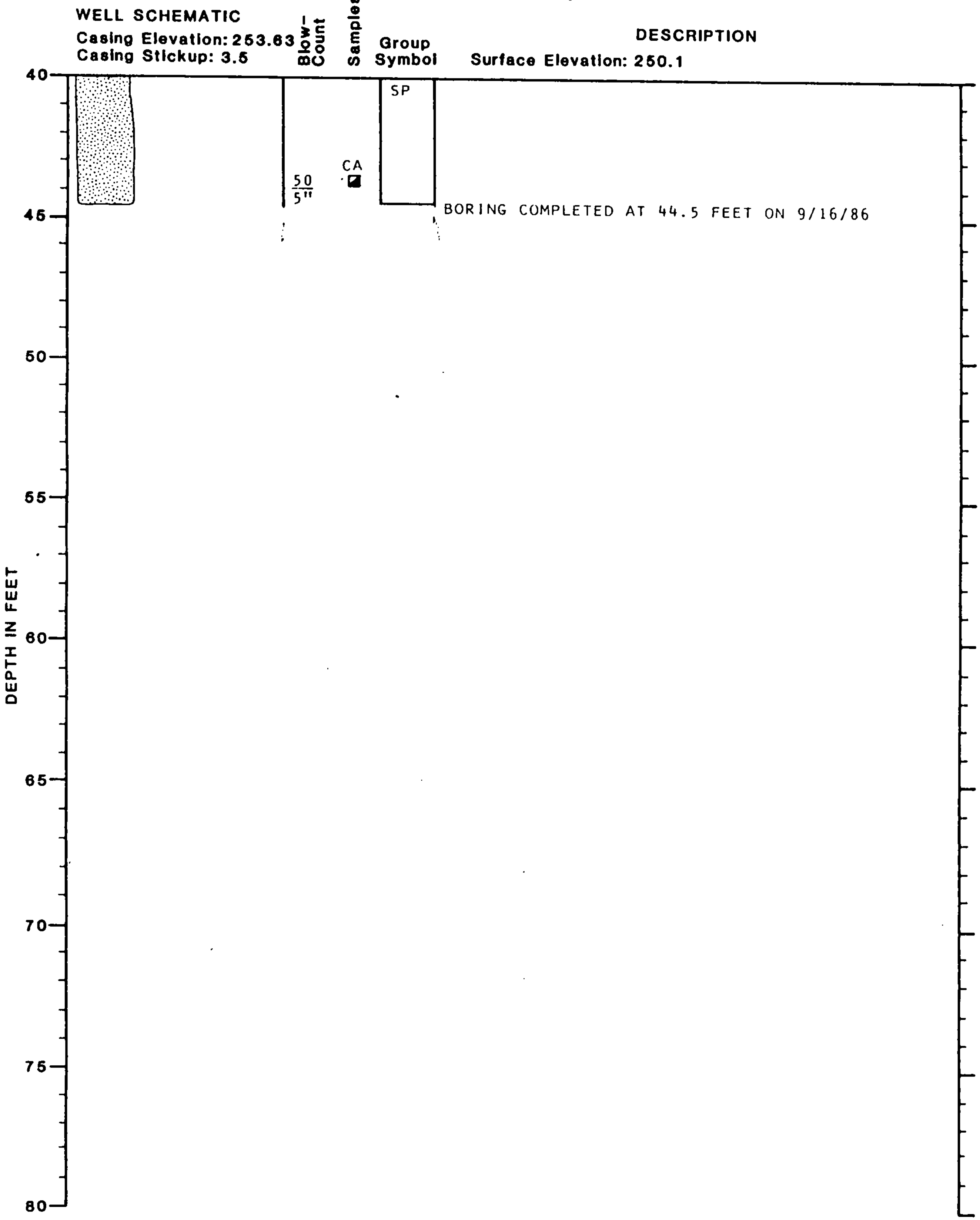
LOG OF MONITOR WELL

FIGURE A-4A

MONITOR WELL NO. MW-2
(Continued)



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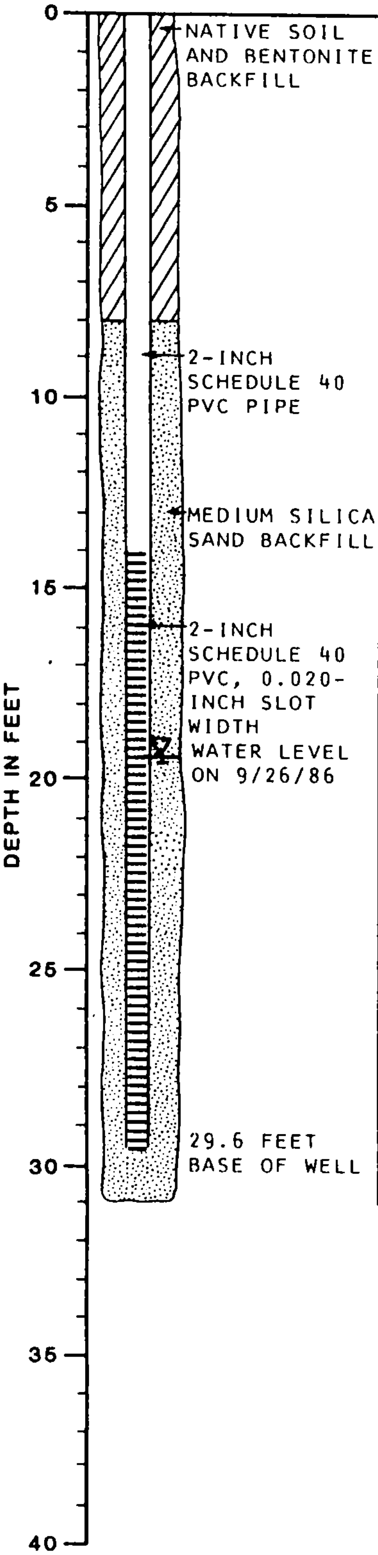
LOG OF MONITOR WELL

FIGURE A-4B

MONITOR WELL NO. MW-3

WELL SCHEMATIC
Casing Elevation: 239.61
Casing Stickup: 2.5



DESCRIPTION
Surface Elevation: 237.1

Depth (feet)	Blow-Count	Samples	Group Symbol	Description
0		CA		FOREST DUFF
0.5			SM	LIGHT GRAY SILTY FINE SAND (DENSE, DRY)
5	42	CA		
7			SP	BROWN FINE TO MEDIUM SAND WITH GRAVEL (MEDIUM DENSE, DAMP)
10	25			
15	22			
18			SP	GRAY FINE TO MEDIUM SAND WITH A TRACE OF SILT (MEDIUM DENSE TO DENSE, MOIST TO WET)
20	19			
25	87/11"			
30	85/10"	CA		
31				BORING COMPLETED AT 31.0 FEET ON 9/17/86

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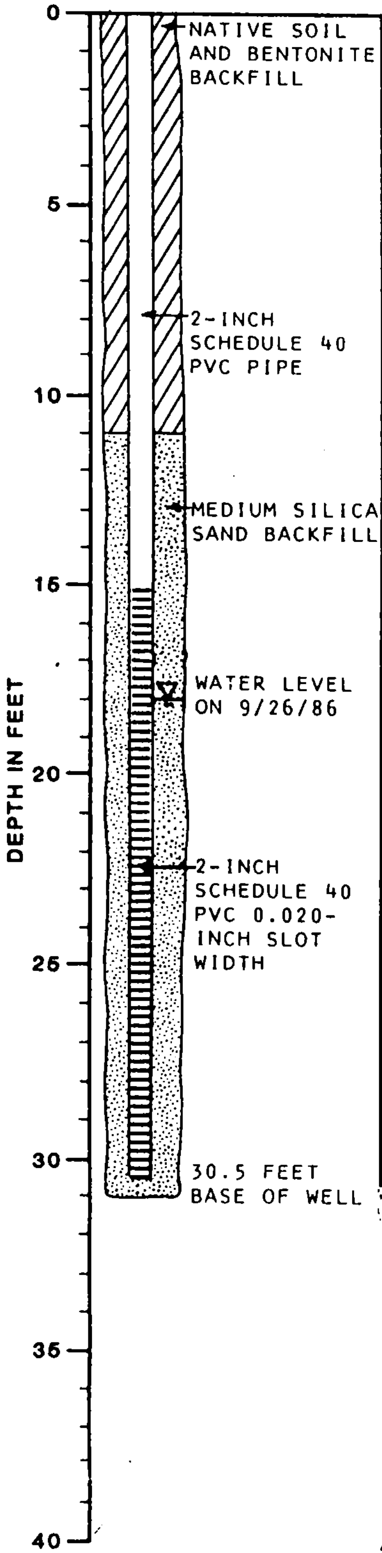
LOG OF MONITOR WELL

FIGURE A-5

MONITOR WELL NO. MW-4

WELL SCHEMATIC
Casing Elevation: 239.29
Casing Stickup: 2.5



DESCRIPTION
Surface Elevation: 236.8

Depth (ft)	Blow-Count	Samples	Group Symbol	Description
0		CA	SM	LIGHT BROWN SILTY FINE SAND (DENSE, DAMP)
5	33	CA		
8			SP	BROWN FINE TO MEDIUM SAND WITH GRAVEL (DENSE, MOIST TO WET)
10	38			
15	31			
20	15			
25	90 / 11"		SP	GRAY FINE TO MEDIUM SAND WITH A TRACE OF GRAVEL AND SILT (VERY DENSE, WET)
30	63	CA		

BORING COMPLETED AT 31.0 FEET ON 9/17/86

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LOG OF MONITOR WELL

FIGURE A-6

APPENDIX B

WORK PLAN

APPENDIX B

WORK PLAN
(Tasks 4 through 8)

Task 4. Provide Support for Interim Remedial Measure (IRM)

Kennedy/Jenks/Chilton will provide support during the implementation of an initial remedial measure (expected to be removal of shallow soil and foundry materials in the vicinity of TP-6, installed previously by others, and removal of oil from underground tanks on the north side of the brass foundry building). This task will be executed during our site characterization activities. A composite of several grab samples of soil in the vicnity of former TP-6 will be collected for analysis to determine disposal requirements. The sample will be analyzed for flash point, heavy metal scan, EP toxicity, PCBs, sulfides, phenols, and cyanide.

Kennedy/Jenks/Chilton will provide resident engineering during soil removal. The field engineer will complete an inspection report and make visual observations of the extent of wastes in the excavation.

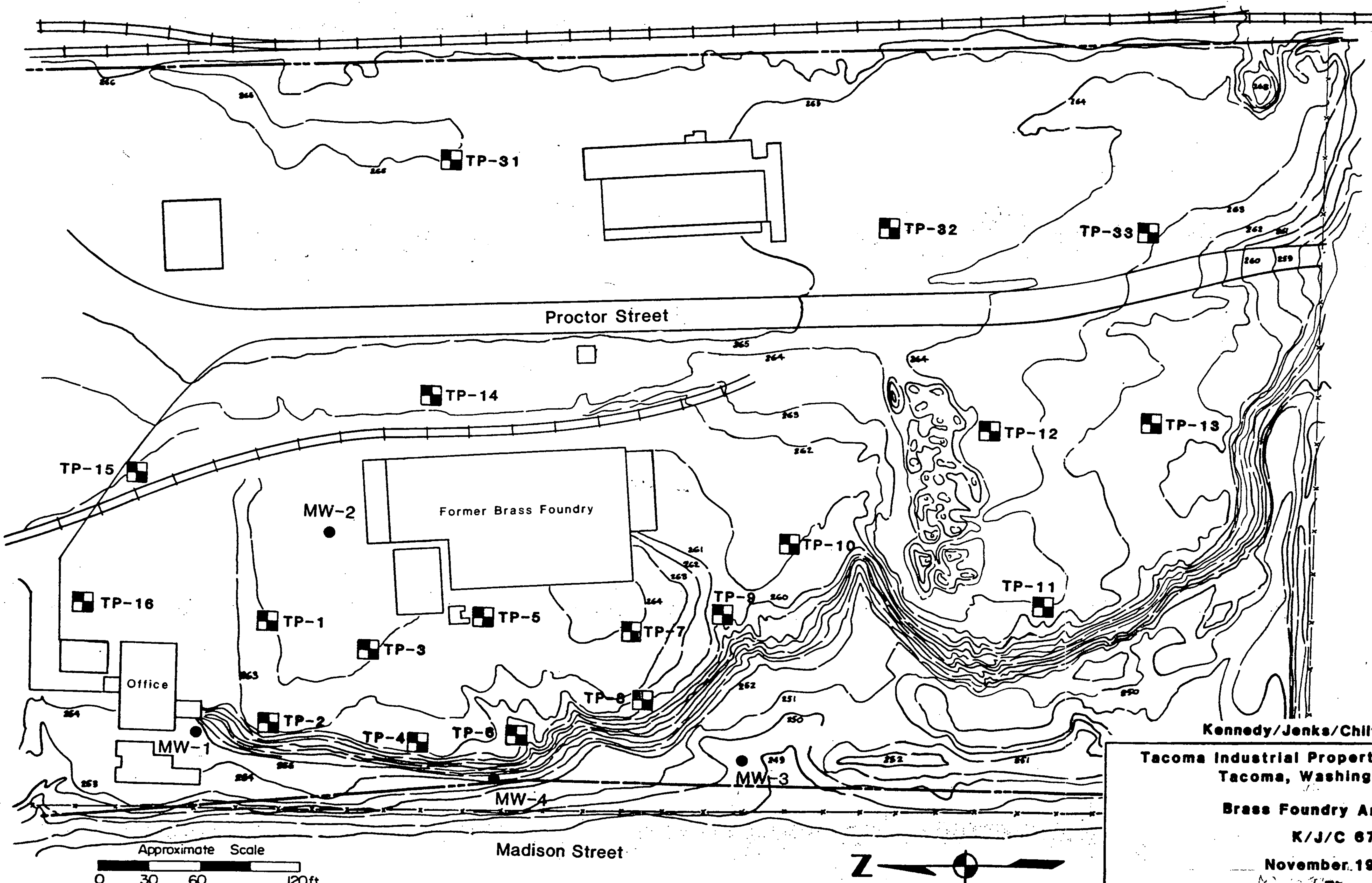
Task 5. Additional Site Characterization

Our approach to sampling and analysis at the site is to gather sufficient information so that remedial actions for the identified problem areas on the site may be defined. Sampling and analysis will concentrate on the areas of the site found to contain elevated levels of heavy metals during previous investigations. The scope of our proposed additional investigation is given below.

Proposed Investigations

Soil Borings and Groundwater Investigation - Four groundwater monitor wells will be installed in the area of the former brass foundry. Groundwater flow direction was assessed during past studies by EPA and resulted in an expected flow of southeast to northwest. One well is anticipated upgradient of areas of elevated metals concentrations as found during previous investigations, and three wells are anticipated downgradient of the area. Locations for the wells are shown in Figure 1. In addition, groundwater wells installed by EPA during past studies in the vicinity of the site will be sampled if access to these wells is granted by EPA. TIP will be responsible for obtaining access to the EPA wells.

Surface and Subsurface Soil Sampling - Selected samples collected during previous investigations (we understand all samples previously collected are in cold storage) will be used for assessing total metals concentrations in surface and subsurface soils onsite. In addition, surface and shallow subsurface soil samples will be grab sampled to assess the extent of elevated metals levels in the immediate area of the brass foundry.



Kennedy/Jenks/Chilton

Tacoma Industrial Properties
Tacoma, Washington

Brass Foundry Area

K/J/C 6733

November 1986

Figure 1

Figure 1

Building Material Sampling - Collection of up to five samples of brass foundry building material/waste is planned to further assess remedial action needs for the building and to compare building waste with materials disposed in the soil onsite.

Laboratory tests simulating building decontamination activities are also planned to assess if the levels of metals in the building could be reduced prior to building demolition.

Air Monitoring - Five temporary air monitoring stations will be selected, with personal air sampling pumps used to collect particulate samples on two separate days. Four sampling pumps will be located in the vicinity of the old brass foundry building. The final air sampling pump will be attached to one onsite worker. This monitoring program should assess if high levels of lead are currently being transported offsite or if onsite personnel could be exposed to high levels of lead (assuming no remedial action were taken).

Other Investigations - Drums located throughout the site, containers within the brass foundry building, and debris within the brass foundry building will be characterized and disposed under a separate investigation/cleanup effort and is not addressed in this work plan.

Chemical Analyses

Soil Boring Samples and Groundwater Samples - Surface samples and samples collected at shallowest depth from each boring will be analyzed for lead and soil pH. The soil samples collected within the groundwater table at each boring will be analyzed for total organic carbon. Groundwater samples from each well will be analyzed in the field for pH, conductivity, oxidation reduction potential, and temperature, as well as for total and dissolved lead and copper in the laboratory. Three selected soil samples will also be subjected to a modified leaching test which is similar in nature to the EP toxicity test, except simulated rainwater is used rather than acidic liquids. This test should provide a more accurate representation of actual contaminant mobility in the environment. Other samples will be held for possible future analyses, if required.

Backhoe Pit Samples (from previous investigations) - The two shallow samples from five selected backhoe pits as well as surface grab samples collected during our study will be analyzed for total lead and copper. In addition, two shallow samples also will be analyzed for cadmium, copper, and zinc.

Building Waste Samples - All samples will be analyzed for EP toxicity lead and for total lead. One of these samples exhibiting high extractable lead will also be analyzed for target EP toxicity metals.

Air Quality Samples - Particulate filters will be analyzed for lead and inorganic lead compounds utilizing NIOSH protocol.

Drilling Protocol

Well Construction - All wells will be drilled using a hollow stem auger. Each well will consist of two- or four-inch diameter, Schedule 40, PVC pipe, the lower portion of which will be completed with ten feet of machine slotted well screen and a bottom plug. The annular space around the screen will be packed with sand. A bentonite/native soil seal will be placed above the sand pack to the ground surface. All wells will be completed above grade with a locking PVC end cap. Following installation, each well will be developed to stabilize the soils around the well. Water level elevations will be assessed with an engineers level.

Sampling Protocol

Well Construction - A field geologist or engineer will log each well boring and obtain soil samples at no less than five-foot intervals. Additional samples may be collected at more closely spaced intervals for visual inspection and possible physical testing. The soil samples will be collected with a drive sampler and samples will be transferred to clean glass jars. Soil samples will be placed in containers with ice.

Groundwater Sampling - All wells will be purged of three to five well volumes prior to sampling. Samples will be collected using a bailer. Containers and preservation techniques will vary according to analysis and will be consistent with 40 CFR Part 136.

Building Material Sampling - Soil and/or waste in the building will be sampled using plastic scoops or steel trowels. Samples will be collected in glass containers and placed on ice for transport to the laboratory.

Air Samples - Samples will be collected for a minimum of six hours and will be collected onto a membrane filter at an approximate flow rate of 1.5 liters per minute. Pumps will be calibrated prior to and following sampling. In addition, predominant wind direction and velocity, temperature, and barometric pressure averaged for the day will also be obtained and noted.

Sample Documentation - All field activities, boring logs, visual observations and sample information will be recorded in a bound field notebook. Each sample will be given a sample number and labeled. Chain-of-custody forms will be completed for all samples collected and will be returned to the laboratory with the samples.

Aquifer Testing

Aquifer testing should not be required unless dissolved metals are detected in significant quantities in groundwater (which is not expected). If aquifer testing is determined to be necessary, we will conduct the test as an additional scope/budget item.

Decontamination

All downhole drilling equipment, sampling equipment, and any other equipment used in soil borings or sampling will be steam cleaned between use to prevent cross-contamination.

All sampling locations will be suitably staked following sampling. In addition, all sampling locations will be recorded and plotted on a base site map (supplied by TIP) by measuring distances (using a tape and compass) from known landmarks.

Task 6. Environmental and Health Issues and Risks Analyses

The purpose of this task is to organize the data obtained during the above tasks and previous field activities by other and to review it against a framework of regulatory and non-regulatory concerns. The finding of this task will be the basis for development and evaluation of alternative remedial actions in Task 7.

Information to be analyzed in the evaluation of the site's environmental and health issues and risks include the following:

- Nature and properties of identified contaminants,
- Potential for contaminant mobility and suspected exposure pathways,
- Potential human receptors or sensitive biological areas at risk, and
- Regulatory requirements.

Two types of potential exposure will be addressed. The first involves exposure from residual contamination remaining at the site. It must be recognized that, despite implementation of a Remedial Action Plan approved by regulatory agencies, complete protection from future localized problems cannot be precluded. Potential complaints may come from future occupants due to direct exposure during uncovering of residual contamination encountered during excavation for basements, sewers, piping, etc. These exposure routes will be addressed during our evaluations and will be reflected in the development of remedial alternatives. A second type of potential exposure is movement of identified chemicals from the site to the surrounding environment by air, groundwater, or surface water. The transport of contaminants left in the soil or groundwater will be estimated using relatively simple models, such as estimating a contaminant's relative velocity based on soil adsorption coefficients.

Current regulatory requirements will be a significant factor in interpretations of the field data as they relate to cleanup and development of the site. Kennedy/Jenks/Chilton will review regulatory requirements as they pertain to residual contamination and the site's potential future liabilities.

Task 7. Remedial Action Alternatives

Kennedy/Jenks/Chilton will develop and evaluate remedial action alternatives for the site, based on previous field investigations, Kennedy/Jenks/Chilton's additional site characterization, and evaluation of the site's environmental and health issues and risks. The remedial alternative development and evaluation will be similar to the guidelines provided by the U.S. EPA for Feasibility Studies under the NCP. Initially, potential remedial technologies will be screened for applicability to the different specific problem areas of the site will be eliminated from further consideration. Technologies will be screened on the basis of general criteria, including technical feasibility, environmental and public health impacts, and preliminary cost estimates.

Technologies that survive the preliminary screening process will be developed into feasible alternatives that could be implemented at the site. Alternatives relevant to specific identified problems on the site will be developed. Each feasible remedial alternative will then be subjected to a detailed evaluation in an effort to identify cost-effective alternative(s) acceptable for the site. Factors to be considered during the detailed evaluation will include cost and non-cost criteria, including technical feasibility, institutional issues, public health issues, environmental impacts, and cost criteria. Technical feasibility analysis will address performance, reliability, constructability, safety and time constraints involved in remediating the site. Institutional issues involve compliance status of each remedial alternative with federal and state regulatory requirements and conditions for non-attainment of relevant standards. The public health analysis will involve an evaluation of the types, toxicity, and potential for release of identified chemicals at the site. The environmental assessment will address each alternative's impact on sensitive environmental areas.

Cost analysis of each feasible alternative will involve an estimation of estimated capital and O & M costs, present worth analysis, and sensitivity analysis for key design criteria or cost factors.

Followng the detailed evaluation of alternatives, Kennedy/Jenks/Chilton will recommend a preferred remedial alternative(s) for the site.

Task 8. Report Preparation

Kennedy/Jenks/Chilton will prepare a final report that will include comments on the draft report for submittal to TIP and appropriate regulatory agencies. In addition, the Kennedy/Jenks/Chilton project team is available to assist TIP in meetings with the appropriate regulatory agencies to gain necessary approvals for the selected remedial alternative(s).

APPENDIX C

LABORATORY ANALYSES REPORTS

Soil Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415 362 6065

For	Kennedy/Jenks/Chilton	Received	9/17/86
Attention	Owen Loshbough	Reported	10/28/86
Address	33301 Ninth Avenue South, Suite 100		
	Federal Way, WA 98003		(K/J/C 6733)

Lab. No.		865551
Source TIP Tacoma, WA	Soil I.D.:	MW-1A
Date Collected		9/15/86
Time Collected		1152
Collected by		K/J/C

Analysis	Units	Analytical Results
pH	Unit	6.3
Lead (Pb) (2)	mg/Kg (1)	84

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by Atomic Absorption Spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW–846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst RS., AD Manager Everett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Soil Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For	Kennedy/Jenks/Chilton
Attention	Owen Loshbough
Address	33301 Ninth Avenue South, Suite 100
	Federal Way, WA 98003

Received 9/17/86
Reported 10/28/86

(K/J/C 6733)

Lab. No.		865552
Source TIP Tacoma, WA	Soil I.D.:	MW-1B
Date Collected		9/15/86
Time Collected		1205
Collected by		K/J/C

Analysis	Units	Analytical Results
pH	Unit	6.0
Lead (Pb) (2)	mg/Kg (1)	<3

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by Atomic Absorption Spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW-846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst RS, AD Manager Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Soil Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For	Kennedy/Jenks/Chilton	Received	9/17/86
Attention	Owen Loshbough	Reported	10/28/86
Address	33301 Ninth Avenue South, Suite 100		
	Federal Way, WA 98003		(K/J/C 6733)

Lab. No.		865553
Source TIP Tacoma, WA	Soil I.D.:	MW-1F
Date Collected		9/15/86
Time Collected		1306
Collected by		K/J/C

Analysis	Units	Analytical Results
Oil and Grease	mg/Kg (1)	610

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW–846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst RS Manager Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Soil Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For Kennedy/Jenks/Chilton
Attention Owen Loshbough
Address 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003

Received 9/17/86
Reported 10/28/86

(K/J/C 6733)

Lab. No. 865554

Source Soil I.D.: MW-1G
TIP
Tacoma, WA

Date Collected 9/15/86

Time Collected 1306

Collected by K/J/C

Analysis	Units	Analytical Results
Total Organic Carbon (C) (2)	mg/Kg (1)	70

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by Dohrmann DC-50 Organic Carbon Analyzer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW–846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst AL Manager Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Soil Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For	Kennedy/Jenks/Chilton
Attention	Owen Loshbough
Address	33301 Ninth Avenue South, Suite 100 Federal Way, WA 98003

Received 9/17/86
Reported 10/28/86

(K/J/C 6733)

Lab. No.		865557
Source TIP Tacoma, WA	Soil I.D.:	MW-2A
Date Collected		9/15/86
Time Collected		1527
Collected by		K/J/C

Analysis	Units	Analytical Results
pH	Unit	6.9
Lead (Pb) (2)	mg/Kg (1)	2800

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by Atomic Absorption Spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW–846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst AD Manager Leveatt R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Soil Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For	Kennedy/Jenks/Chilton	Received	9/17/86
Attention	Owen Loshbough	Reported	10/28/86
Address	33301 Ninth Avenue South, Suite 100		
	Federal Way, WA 98003		(K/J/C 6733)

Lab. No.		865558
Source TIP Tacoma, WA	Soil I.D.:	MW-2B
Date Collected		9/15/86
Time Collected		1538
Collected by		K/J/C

Analysis	Units	Analytical Results
pH	Unit	7.5
Lead (Pb) (2)	mg/Kg (1)	4200

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by Atomic Absorption Spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW-846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst RS Manager Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Soil Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415 362-6065

For	Kennedy/Jenks/Chilton	Received	11/5/86
Attention	Nathan Graves	Reported	12/2/86
Address	33301 Ninth Avenue South, Suite 100		
	Federal Way, WA 98003		(K/J/C 6733)

Lab. No.	867790
Source TIP Tacoma, WA	MW-2C
Date Collected	9/15/86
Time Collected	-
Collected by	K/J/C

Analysis	Units	Analytical Results
T. Lead (Pb)	mg/Kg	54

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by Atomic Absorption Spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW–846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst BC Manager Leverett R. Smith

Soil Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415 362-6065

For	Kennedy/Jenks/Chilton	Received	9/17/86
Attention	Owen Loshbough	Reported	10/28/86
Address	33301 Ninth Avenue South, Suite 100		
	Federal Way, WA 98003		(K/J/C 6733)

Lab. No.		865559
Source TIP Tacoma, WA	Soil I.D.:	MW-2F
Date Collected		9/15/86
Time Collected		1611
Collected by		K/J/C

Analysis	Units	Analytical Results
Oil and Grease	mg/Kg (1)	6700

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW–846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst RS Manager Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Kennedy/Jenks/Chilton, Laboratory Division
657 Howard Street
San Francisco, CA 94105
415-362-6065

Received 9/17/86
Reported 12/2/86

Soil Analysis Report

For: Kennedy/Jenks/Chilton
Attn: Nathan Graves
Address: 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003

(K/J/C 6733)

Lab. No.: 865559

Source: MW-2F
TIP
Tacoma, WA

Date Collected: 9/15/86

Time Collected: 1610

Collected by: K/J/C

Analysis	Units *	Analytical Results
PURGEABLES		
Benzene	ug/Kg	<8
Chlorobenzene	ug/Kg	<8
1,2-Dichlorobenzene	ug/Kg	<8
1,3-Dichlorobenzene	ug/Kg	<8
1,4-Dichlorobenzene	ug/Kg	<8
Ethylbenzene	ug/Kg	38
Toluene	ug/Kg	10
Total xylenes	ug/Kg	90

Comments: Analysis by EPA Method 8020 (Purgeable Aromatics).

* Micrograms per kilogram, wet (as received) weight basis

Analyst BC

Manager Leverett R. Smith

Soil Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415 362-6065

For Kennedy/Jenks/Chilton
Attention Nathan Graves
Address 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003

Received 11/5/86
Reported 12/2/86

(K/J/C 6733)

Lab. No.	867791
Source TIP Tacoma, WA	MW-2G
Date Collected	9/15/86
Time Collected	1618
Collected by	K/J/C

Analysis	Units	Analytical Results
Oil and Grease	mg/Kg	32,000

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by Atomic Absorption Spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW–846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst RS Manager Leverett R. Smith

Kennedy/Jenks/Chilton, Laboratory Division
657 Howard Street
San Francisco, CA 94105
415-362-6065

Received 11/5/86
Reported 12/2/86

Soil Analysis Report

For: Kennedy/Jenks/Chilton
Attn: Nathan Graves
Address: 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003

(K/J/C 6733)

Lab. No.: 867791

Source: MW-2G
TIP
Tacoma, WA

Date Collected: 9/15/86

Time Collected: 1618

Collected by: K/J/C

Analysis	Units *	Analytical Results
PURGEABLES		
Benzene	mg/Kg	<0.5
Chlorobenzene	mg/Kg	<0.5
1,2-Dichlorobenzene	mg/Kg	<0.5
1,3-Dichlorobenzene	mg/Kg	<0.5
1,4-Dichlorobenzene	mg/Kg	<0.5
Ethylbenzene	mg/Kg	0.8
Toluene	mg/Kg	<0.5
Total xylenes	mg/Kg	5.9

Comments: Analysis by EPA Method 8020 (Purgeable Aromatics).

* Milligrams per kilogram, wet (as received) weight basis

Analyst BC

Manager Leverett R. Smith

Soil Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For	Kennedy/Jenks/Chilton	Received	11/5/86
Attention	Nathan Graves	Reported	12/2/86
Address	33301 Ninth Avenue South, Suite 100 Federal Way, WA 98003		(K/J/C 6733)

Lab. No.	867792
Source TIP Tacoma, WA	MW-2H
Date Collected	9/15/86
Time Collected	-
Collected by	K/J/C

Analysis	Units	Analytical Results
Oil and Grease	mg/Kg	210

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by Atomic Absorption Spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW–846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst RS Manager Leverett R. Smith

Kennedy/Jenks/Chilton, Laboratory Division
657 Howard Street
San Francisco, CA 94105
415-362-6065

Received 11/5/86
Reported 12/2/86

Soil Analysis Report

For: Kennedy/Jenks/Chilton
Attn: Nathan Graves
Address: 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003

(K/J/C 6733)

Lab. No.: 867792

Source: MW-2H
TIP
Tacoma, WA

Date Collected: 9/15/86

Time Collected: -

Collected by: K/J/C

Analysis	Units *	Analytical Results
PURGEABLES		
Benzene	mg/Kg	<0.5
Chlorobenzene	mg/Kg	<0.5
1,2-Dichlorobenzene	mg/Kg	<0.5
1,3-Dichlorobenzene	mg/Kg	<0.5
1,4-Dichlorobenzene	mg/Kg	<0.5
Ethylbenzene	mg/Kg	<0.5
Toluene	mg/Kg	<0.5
Total xylenes	mg/Kg	<0.5

Comments: Analysis by EPA Method 8020 (Purgeable Aromatics).

* Milligrams per kilogram, wet (as received) weight basis

Analyst BC

Manager Leverett R. Smith

Soil Analysis Report

Kennedy/Jenks/Chilton

Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For Attention Address	Kennedy/Jenks/Chilton Owen Loshbough 33301 Ninth Avenue South, Suite 100 Federal Way, WA 98003	Received Reported	9/17/86 10/28/86 (K/J/C 6733)

Lab. No.		865560
Source TIP Tacoma, WA	Soil I.D.:	MW-2J
Date Collected		9/16/86
Time Collected		0910
Collected by		K/J/C

Analysis	Units	Analytical Results
Total Organic Carbon (C) (2)	mg/Kg (1)	120

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by Dohrmann DC-50 Organic Carbon Analyzer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW–846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst AL Manager Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Soil Analysis Report

Kennedy/Jenks/Chilton

Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For	Kennedy/Jenks/Chilton	Received	9/19/86
Attention	Owen Loshbough	Reported	10/24/86
Address	33301 Ninth Avenue South, Suite 100		
	Federal Way, WA 98003		(K/J/C 6733)

Lab. No.		865591
Source TIP Tacoma, WA	Soil I.D.:	MW-3A
Date Collected		9/17/86
Time Collected		0854
Collected by		K/J/C

Analysis	Units	Analytical Results
pH	Unit	5.6
Lead (Pb) (2)	mg/Kg (1)	140

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by Atomic Absorption Spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW–846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst LP, AD Manager Leveritt R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Soil Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For	Kennedy/Jenks/Chilton	Received	9/19/86
Attention	Owen Loshbough	Reported	10/24/86
Address	33301 Ninth Avenue South, Suite 100		
	Federal Way, WA 98003		(K/J/C 6733)

Lab. No.		865592
Source TIP Tacoma, WA	Soil I.D.:	MW-3B
Date Collected		9/17/86
Time Collected		0950
Collected by		K/J/C

Analysis	Units	Analytical Results
pH	Unit	6.0
Lead (Pb) (2)	mg/Kg (1)	<3

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by Atomic Absorption Spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW–846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst LP, AD Manager Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Soil Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For	Kennedy/Jenks/Chilton	Received	9/19/86
Attention	Owen Loshbough	Reported	10/24/86
Address	33301 Ninth Avenue South, Suite 100		
	Federal Way, WA 98003		(K/J/C 6733)

Lab. No.		865593
Source TIP Tacoma, WA	Soil I.D.:	MW-3G
Date Collected		9/17/86
Time Collected		1053
Collected by		K/J/C

Analysis	Units	Analytical Results
Total Organic Carbon (C) (2)	mg/Kg (1)	83

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by Dohrmann DC-50 Organic Carbon Analyzer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW–846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst AL Manager Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Soil Analysis Report

Kennedy/Jenks/Chilton

Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For Kennedy/Jenks/Chilton
Attention Owen Loshbough
Address 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003

Received 9/19/86
Reported 10/24/86

(K/J/C 6733)

Lab. No. 865594

Source Soil I.D.: MW-4A
TIP
Tacoma, WA

Date Collected 9/17/86

Time Collected 1255

Collected by K/J/C

Analysis	Units	Analytical Results
pH	Unit	5.9
Lead (Pb) (2)	mg/Kg (1)	440
Copper (Cu) (2)	mg/Kg (1)	150
Cadmium (Cd) (2)	mg/Kg (1)	0.59
Zinc (Zn) (2)	mg/Kg (1)	430

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by Atomic Absorption Spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW–846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst LP, AD Manager Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

EP Toxicity Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For Attention Address	Kennedy/Jenks/Chilton Owen Loshbough 33301 Ninth Avenue South, Suite 100 Federal Way, WA 98003	Received Reported	9/19/86 10/24/86 (K/J/C 6733)

Lab. No.		865594
Source TIP Tacoma, WA	Soil I.D.:	MW-4A
Date Collected		9/17/86
Time Collected		1255
Collected by		K/J/C

Contaminant	Units	Concentration in Extract (1)
Cadmium (Cd) (2)	mg/L	<0.01
Copper (Cu) (2)	mg/L	0.02
Zinc (Zn) (2)	mg/L	0.10
Lead (Pb) (2)	mg/L	<0.5

Final pH of extract = 6.5

Note:

(1) Extraction was conducted in accordance with the EP Toxicity method outlined in SW-846, except that the extraction solution used was deionized water.
(2) Analysis by Atomic Absorption Spectrophotometry.

Comments:

Reference: "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods, "SW-846, Second Edition, 1984, U.S. EPA.

Analyst AD Manager Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

NOTE

Soil Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For Kennedy/Jenks/Chilton
Attention Owen Loshbough
Address 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003

Received 9/19/86
Reported 10/24/86

(K/J/C 6733)

Lab. No.		865595
Source TIP Tacoma, WA	Soil I.D.:	MW-4B
Date Collected		9/17/86
Time Collected		1307
Collected by		K/J/C

Analysis	Units	Analytical Results
pH	Unit	5.2
Lead (Pb) (2)	mg/Kg (1)	<3

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by Atomic Absorption Spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW–846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst LP, AD Manager Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Soil Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For Kennedy/Jenks/Chilton
Attention Owen Loshbough
Address 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003

Received 9/19/86
Reported 10/24/86

(K/J/C 6733)

Lab. No.		865596
Source TIP Tacoma, WA	Soil I.D.:	MW-4G
Date Collected		9/17/86
Time Collected		1402
Collected by		K/J/C

Analysis	Units	Analytical Results
Total Organic Carbon (C) (2)	mg/Kg (1)	29

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by Dohrmann DC-50 Organic Carbon Analyzer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW–846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst AL Manager Everett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Water Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For	Kennedy/Jenks/Chilton	Received	9/30/86
Attention	Owen Loshbough	Reported	10/27/86
Address	33301 Ninth Avenue South, Suite 100		
	Federal Way, WA 98003		(K/J/C 6733)

Lab. No.	865782
Source TIP Tacoma, WA	Water, MW-1
Date Collected	9/26/86
Time Collected	1226
Collected by	K/J/C

Analysis	Units	Analytical Results
T. Copper (Cu) (1)	mg/L	0.02
Dissolved Copper (Cu) (1)	mg/L	<0.01
T. Lead (Pb) (1)	mg/L	0.02
Dissolved Lead (Pb) (1)	mg/L	<0.01

Comments:
(1) Analysis by Atomic Absorption Spectrophotometer.
Dissolved metal is defined as the fraction passing through a 0.45 micron filter.

Analyst AD Manager Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Water Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For Kennedy/Jenks/Chilton
Attention Owen Loshbough
Address 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003

Received 9/30/86
Reported 10/27/86

(K/J/C 6733)

Lab. No.	865783
Source TIP Tacoma, WA	Water, MW-2
Date Collected	9/26/86
Time Collected	1423
Collected by	K/J/C

Analysis	Units	Analytical Results
T. Copper (Cu) (1)	mg/L	<0.01
Dissolved Copper (Cu) (1)	mg/L	<0.01
T. Lead (Pb) (1)	mg/L	<0.01
Dissolved Lead (Pb) (1)	mg/L	<0.01

Comments:
(1) Analysis by Atomic Absorption Spectrophotometer.
Dissolved metal is defined as the fraction passing through a 0.45 micron filter.

Analyst AD Manager Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Kennedy/Jenks/Chilton, Laboratory Division
657 Howard Street
San Francisco, CA 94105
415-362-6065

Received 10/7/86
Reported 11/3/86

Water Analysis Report

For: Kennedy/Jenks/Chilton
Attn: Mr. Nathan Graves
Address: 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003

(K/J/C 6738)

Lab.No.:	865998
Source: TIP Tacoma, WA	Water, MW2
Date Collected:	10/2/86
Time Collected:	-
Collected by:	K/J/C

Analysis	Units*	Analytical Results
PURGEABLES		
Benzene	ug/L	<1
Chlorobenzene	ug/L	<1
1,2-Dichlorobenzene	ug/L	<1
1,3-Dichlorobenzene	ug/L	<1
1,4-Dichlorobenzene	ug/L	<1
Ethylbenzene	ug/L	<1
Toluene	ug/L	<1
o-xylene	ug/L	<1
m-xylene	ug/L	<1
p-xylene	ug/L	<1

Comments: Analysis by EPA Method 602 (Purgeable Aromatics)

* Micrograms per liter

Analyst SL, AL

Manager Leverett R. Smith

Water Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For Kennedy/Jenks/Chilton
Attention Owen Loshbough
Address 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003

Received 9/30/86
Reported 10/27/86

(K/J/C 6733)

Lab. No. 865784

Source Water, MW-3
TIP
Tacoma, WA

Date Collected 9/26/86

Time Collected 1306

Collected by K/J/C

Analysis	Units	Analytical Results
T. Copper (Cu) (1)	mg/L	<0.01
Dissolved Copper (Cu) (1)	mg/L	<0.01
T. Lead (Pb) (1)	mg/L	<0.01
Dissolved Lead (Pb) (1)	mg/L	<0.01

Comments:
(1) Analysis by Atomic Absorption Spectrophotometer.
Dissolved metal is defined as the fraction passing through a 0.45 micron filter.

Analyst AD Manager Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Water Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For	Kennedy/Jenks/Chilton	Received	9/30/86
Attention	Owen Loshbough	Reported	10/27/86
Address	33301 Ninth Avenue South, Suite 100		
	Federal Way, WA 98003		(K/J/C 6733)

Lab. No.	865785
Source TIP Tacoma, WA	Water, MW-4
Date Collected	9/26/86
Time Collected	1341
Collected by	K/J/C

Analysis	Units	Analytical Results
T. Copper (Cu) (1)	mg/L	<0.01
Dissolved Copper (Cu) (1)	mg/L	<0.01
T. Lead (Pb) (1)	mg/L	0.01
Dissolved Lead (Pb) (1)	mg/L	<0.01

Comments:
(1) Analysis by Atomic Absorption Spectrophotometer.
Dissolved metal is defined as the fraction passing through a 0.45 micron filter.

Analyst AD Manager Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

Water Analysis Report

For	Kennedy/Jenks/Chilton	Received	9/30/86
Attention	Mr. Nathan Graves	Reported	12/3/86
Address	33301 Ninth Avenue South, Suite 100		
	Federal Way, WA 98003		(K/J/C 6733)

Lab. No.	867785
Source TIP Tacoma, WA	Water, MW-4
Date Collected	9/26/86
Time Collected	1341
Collected by	K/J/C

Analysis	Units	Analytical Results
Total Zinc (Zn)	mg/L	0.05
Dissolved Zinc (Zn)*	mg/L	0.02
Total Cadmium (Cd)	mg/L	<0.002
Dissolved Cadmium (Cd)*	mg/L	<0.002

Comments:

*Dissolved metal is defined as the fraction passing through a 0.45 micron filter.

Analyst AD Manager Leverett R. Smith

Water Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For	Kennedy/Jenks/Chilton	Received	9/30/86
Attention	Owen Loshbough	Reported	10/27/86
Address	33301 Ninth Avenue South, Suite 100		
	Federal Way, WA 98003		(K/J/C 6733)

Lab. No.	865780
Source TIP Tacoma, WA	Water, CBS-04
Date Collected	9/26/86
Time Collected	1103
Collected by	K/J/C

Analysis	Units	Analytical Results
T. Copper (Cu) (1)	mg/L	<0.01
Dissolved Copper (Cu) (1)	mg/L	<0.01
T. Lead (Pb) (1)	mg/L	0.02
Dissolved Lead (Pb) (1)	mg/L	0.01

Comments:
(1) Analysis by Atomic Absorption Spectrophotometer.
Dissolved metal is defined as the fraction passing through a 0.45 micron filter.

Analyst AD Manager Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Water Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For Attention Address	Kennedy/Jenks/Chilton Owen Loshbough 33301 Ninth Avenue South, Suite 100 Federal Way, WA 98003	Received Reported	9/30/86 10/27/86 (K/J/C 6733)

Lab. No.	865779
Source TIP Tacoma, WA	Water, CBS-05
Date Collected	9/26/86
Time Collected	1009
Collected by	K/J/C

Analysis	Units	Analytical Results
T. Copper (Cu) (1)	mg/L	<0.01
Dissolved Copper (Cu) (1)	mg/L	<0.01
T. Lead (Pb) (1)	mg/L	0.02
Dissolved Lead (Pb) (1)	mg/L	<0.01

Comments:
(1) Analysis by Atomic Absorption Spectrophotometer.
Dissolved metal is defined as the fraction passing through a 0.45 micron filter.

Analyst AD Manager Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Water Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For	Kennedy/Jenks/Chilton	Received	9/30/86
Attention	Owen Loshbough	Reported	10/27/86
Address	33301 Ninth Avenue South, Suite 100		
	Federal Way, WA 98003		(K/J/C 6733)

Lab. No.	865781
Source TIP Tacoma, WA	Water, CBS-12
Date Collected	9/26/86
Time Collected	1150
Collected by	K/J/C

Analysis	Units	Analytical Results
T. Copper (Cu) (1)	mg/L	<0.01
Dissolved Copper (Cu) (1)	mg/L	<0.01
T. Lead (Pb) (1)	mg/L	0.03
Dissolved Lead (Pb) (1)	mg/L	<0.01

Comments:
(1) Analysis by Atomic Absorption Spectrophotometer.
Dissolved metal is defined as the fraction passing through a 0.45 micron filter.

Analyst AD Manager Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Soil Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For	Kennedy/Jenks/Chilton	Received	9/17/86
Attention	Owen Loshbough	Reported	10/28/86
Address	33301 Ninth Avenue South, Suite 100		
	Federal Way, WA 98003		(K/J/C 6733)

Lab. No.		865561
Source TIP Tacoma, WA	Soil I.D.:	SS-1
Date Collected		9/8/86
Time Collected		1020
Collected by		K/J/C

Analysis	Units	Analytical Results
Lead (Pb) (2)	mg/Kg (1)	140,000

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by atomic absorption spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW–846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst AD Manager Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Soil Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For Kennedy/Jenks/Chilton
Attention Owen Loshbough
Address 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003

Received 9/17/86
Reported 10/28/86

(K/J/C 6733)

Lab. No.		865562
Source TIP Tacoma, WA	Soil I.D.:	SS-2
Date Collected		9/8/86
Time Collected		1026
Collected by		K/J/C

Analysis	Units	Analytical Results
Lead (Pb) (2)	mg/Kg (1)	94,000

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by atomic absorption spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW–846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst AD Manager Everett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Soil Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For	Kennedy/Jenks/Chilton	Received	9/17/86
Attention	Owen Loshbough	Reported	10/28/86
Address	33301 Ninth Avenue South, Suite 100		
	Federal Way, WA 98003		(K/J/C 6733)

Lab. No.		865563
Source TIP Tacoma, WA	Soil I.D.:	SS-3
Date Collected		9/8/86
Time Collected		1029
Collected by		K/J/C

Analysis	Units	Analytical Results
Specific Gravity	-	2.1
Lead (Pb) (2)	mg/Kg (1)	120,000
Phenols	mg/Kg (1)	0.15
Copper (Cu) (2)	mg/Kg (1)	9400
Cadmium (Cd)	mg/Kg (1)	51
Zinc (Zn)	mg/Kg (1)	140,000
Hexavalent Chromium (Cr^{+6})	mg/Kg (1)	<0.05
Sulfides (S=)	mg/Kg (1)	<0.1
Cyanide (CN)	mg/Kg (1)	<1

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by atomic absorption spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW–846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst AD, LP, TK, RS Manager Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Soil Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For	Kennedy/Jenks/Chilton	Received	9/17/86
Attention	Nathan Graves	Reported	12/2/86
Address	33301 Ninth Avenue South, Suite 100		
	Federal Way, WA 98003		(K/J/C 6733)

Lab. No.	865563
Source TIP Tacoma, WA	Soil I.D.: SS-3
Date Collected	9/8/86
Time Collected	1029
Collected by	K/J/C

Analysis	Units	Analytical Results
Barium (Ba)(2)	mg/Kg (1)	<3
T. Chromium (Cr)(2)	mg/Kg (1)	11
Mercury (Hg)(2)	mg/Kg (1)	0.56
Nickel (Ni)(2)	mg/Kg (1)	250
Selenium (Se)(2)	mg/Kg (1)	<0.3
Silver (Ag)(2)	mg/Kg (1)	9.1
Thallium (Tl)(2)	mg/Kg (1)	<3

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by Atomic Absorption Spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW-846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst BC

Manager Leverett R. Smith

EP Toxicity Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For Attention Address
Kennedy/Jenks/Chilton
Owen Loshbough
33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003

Received 9/17/86
Reported 10/28/86

(K/J/C 6733)

Lab. No.		865563
Source TIP Tacoma, WA	Soil I.D.:	SS-3
Date Collected		9/8/86
Time Collected		1029
Collected by		K/J/C

Contaminant	**Units**	**Concentration in Extract (1)**
Cadmium (Cd) (2)	mg/L	0.14
Copper (Cu) (2)	mg/L	0.04
Zinc (Zn) (2)	mg/L	64
Lead (Pb) (2)	mg/L	1.6

Final pH of extract = 5.9

Note:

(1) Extraction was conducted in accordance with the EP Toxicity method outlined in SW-846, except that the extraction solution used was deionized water.
(2) Analysis by Atomic Absorption Spectrophotometry.

Comments:

Reference: "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods, "SW-846, Second Edition, 1984, U.S. EPA.

Analyst AD Manager Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Soil Analysis Report

Kennedy/Jenks/Chilton

Laboratory Division
657 Howard Street
San Francisco, California 94105
415 362 6065

For Kennedy/Jenks/Chilton
Attention Owen Loshbough
Address 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003

Received 10/23/86
Reported 10/31/86

(K/J/C 6733)

Lab. No. 867357

Source
TIP
Tacoma, WA

Soil I.D.: SS-5
Depth: Surface

Date Collected 10/17/86

Time Collected 1441

Collected by K/J/C

Analysis	Units	Analytical Results
Lead (Pb) (2)	mg/Kg (1)	35,000
Copper (Cu) (2)	mg/Kg (1)	93,000

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by atomic absorption spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW-846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst AD Manager Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Soil Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For	Kennedy/Jenks/Chilton	Received	9/17/86
Attention	Owen Loshbough	Reported	10/28/86
Address	33301 Ninth Avenue South, Suite 100		
	Federal Way, WA 98003		(K/J/C 6733)

Lab. No.		865555
Source TIP Tacoma, WA	Sample I.D.:	Wall (from wall of building)
Date Collected		9/15/86
Time Collected		0810
Collected by		K/J/C

Analysis	Units	Analytical Results
Lead (Pb) (2)	mg/Kg (1)	150,000
Copper (Cu) (2)	mg/Kg (1)	340,000

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by Atomic Absorption Spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW–846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst AD Manager Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Soil Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415 362 6065

For	Kennedy/Jenks/Chilton	Received	9/17/86
Attention	Owen Loshbough	Reported	10/28/86
Address	33301 Ninth Avenue South, Suite 100		
	Federal Way, WA 98003		(K/J/C 6733)

Lab. No.		865556
Source TIP Tacoma, WA	Soil I.D.:	Slope
Date Collected		9/15/86
Time Collected		0845
Collected by		K/J/C

Analysis	Units	Analytical Results
Lead (Pb) (2)	mg/Kg (1)	64,000
Copper (Cu) (2)	mg/Kg (1)	410,000

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by Atomic Absorption Spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW–846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst AD Manager Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Soil Analysis Report

Kennedy/Jenks/Chilton

Laboratory Division
657 Howard Street
San Francisco, California 94105
415 362 6065

For	Kennedy/Jenks/Chilton	Received	10/23/86
Attention	Owen Loshbough	Reported	10/31/86
Address	33301 Ninth Avenue South, Suite 100		
	Federal Way, WA 98003		(K/J/C 6733)

Lab. No. 867358

Source: TIP, Tacoma, WA — Soil I.D.: TP-1; Depth: 5 ft

Date Collected –

Time Collected –

Collected by K/J/C

Analysis	Units	Analytical Results
Lead (Pb) (2)	mg/Kg (1)	810

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by atomic absorption spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW-846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst AD Manager Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Soil Analysis Report

Kennedy/Jenks/Chilton

Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For	Kennedy/Jenks/Chilton	Received	10/23/86
Attention	Owen Loshbough	Reported	10/31/86
Address	33301 Ninth Avenue South, Suite 100		
	Federal Way, WA 98003		(K/J/C 6733)

Lab. No.		867365
Source TIP Tacoma, WA	Soil I.D.: Depth:	TP-5 4.5 ft
Date Collected		-
Time Collected		-
Collected by		K/J/C

Analysis	Units	Analytical Results
Lead (Pb) (2)	mg/Kg (1)	89
Copper (Cu) (2)	mg/Kg (1)	230
Cadmium (Cd) (2)	mg/Kg (1)	<0.05
Zinc (Zn) (2)	mg/Kg (1)	150

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by atomic absorption spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW-846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst AD Manager Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Soil Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For	Kennedy/Jenks/Chilton	Received	10/23/86
Attention	Owen Loshbough	Reported	10/31/86
Address	33301 Ninth Avenue South, Suite 100		
	Federal Way, WA 98003		(K/J/C 6733)

Lab. No.		867366
Source TIP Tacoma, WA	Soil I.D.: Depth:	TP-6 3-4 ft
Date Collected		-
Time Collected		-
Collected by		K/J/C

Analysis	Units	Analytical Results
Lead (Pb) (2)	mg/Kg (1)	350

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by atomic absorption spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW–846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst AD   Manager Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Soil Analysis Report

Kennedy/Jenks/Chilton

Laboratory Division
657 Howard Street
San Francisco, California 94105
415 362 6065

For	Kennedy/Jenks/Chilton	Received	10/23/86
Attention	Nathan Graves	Reported	12/2/86
Address	33301 Ninth Avenue South, Suite 100		
	Federal Way, WA 98003		(K/J/C 6733)

Lab. No.	867366
Source TIP Tacoma, WA	TP-6 Depth 3-4 ft
Date Collected	10/17/86
Time Collected	-
Collected by	K/J/C

Analysis	Units	Analytical Results
T. Zinc (Zn)	mg/Kg	2200

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by Atomic Absorption Spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW–846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst AD Manager Leverett R. Smith

Soil Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415 362-6065

For	Kennedy/Jenks/Chilton
Attention	Nathan Graves
Address	33301 Ninth Avenue South, Suite 100
	Federal Way, WA 98003

Received 10/23/86
Reported 12/2/86
Quality Control Page
(K/J/C 6733)

Lab. No.	867366
Source TIP Tacoma, WA	TP-6 Depth 3-4 ft
Date Collected	10/17/86
Time Collected	-
Collected by	K/J/C

Analysis	Units		Replicate	Analytical Results
T. Zinc (Zn)	mg/Kg	2300	2006	Spike recovery 74%

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by Atomic Absorption Spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW–846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst AD Manager Leverett R. Smith

Soil Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415 362 6065

For: Kennedy/Jenks/Chilton
Attention: Owen Loshbough
Address: 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003

Received: 10/23/86
Reported: 10/31/86

(K/J/C 6733)

Lab. No.: 867359

Source
TIP
Tacoma, WA

Soil I.D.: TP-9
Depth: 5.5 ft

Date Collected: –

Time Collected: –

Collected by: K/J/C

Analysis	Units	Analytical Results
Lead (Pb) (2)	mg/Kg (1)	110
Copper (Cu) (2)	mg/Kg (1)	140
Cadmium (Cd) (2)	mg/Kg (1)	<0.04
Zinc (Zn) (2)	mg/Kg (1)	73

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by atomic absorption spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW–846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst: AD

Manager: Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Soil Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415 362 6065

For	Kennedy/Jenks/Chilton	Received	10/27/86
Attention	Owen Loshbough	Reported	10/28/86
Address	33301 Ninth Avenue South, Suite 100		
	Federal Way, WA 98003		(K/J/C 6733)

Lab. No.		867513
Source TIP Tacoma, WA	Soil I.D.:	TP-13
Date Collected		10/24/86
Time Collected		1440
Collected by		K/J/C

Analysis	Units	Analytical Results
Lead (Pb) (2)	mg/Kg (1)	52

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by Atomic Absorption Spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW–846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst AD Manager Leveatt R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Soil Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For	Kennedy/Jenks/Chilton	Received	10/23/86
Attention	Owen Loshbough	Reported	10/31/86
Address	33301 Ninth Avenue South, Suite 100		
	Federal Way, WA 98003		(K/J/C 6733)

Lab. No.		867364
Source TIP Tacoma, WA	Soil I.D.:	TP-16
	Depth:	1.5 ft
Date Collected		–
Time Collected		–
Collected by		K/J/C

Analysis	Units	Analytical Results
Lead (Pb) (2)	mg/Kg (1)	8.8

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by atomic absorption spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW–846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst AD Manager Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Soil Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For Kennedy/Jenks/Chilton
Attention Owen Loshbough
Address 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003

Received 10/23/86
Reported 10/31/86

(K/J/C 6733)

Lab. No. 867362

Source
TIP
Tacoma, WA

Soil I.D.: TP-20
Depth: 0-3 ft

Date Collected –

Time Collected –

Collected by K/J/C

Analysis	Units	Analytical Results
Lead (Pb) (2)	mg/Kg (1)	240
Copper (Cu) (2)	mg/Kg (1)	90
Cadmium (Cd) (2)	mg/Kg (1)	<0.04
Zinc (Zn) (2)	mg/Kg (1)	42

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by atomic absorption spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW–846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst AD Manager Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Soil Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For	Kennedy/Jenks/Chilton	Received	10/23/86
Attention	Owen Loshbough	Reported	10/31/86
Address	33301 Ninth Avenue South, Suite 100		
	Federal Way, WA 98003		(K/J/C 6733)

Lab. No.		867363
Source TIP Tacoma, WA	Soil I.D.: Depth:	TP-20 7-9 ft
Date Collected		-
Time Collected		-
Collected by		K/J/C

Analysis	Units	Analytical Results
Lead (Pb) (2)	mg/Kg (1)	3.1

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by atomic absorption spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW-846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst AD Manager Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Soil Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415 362 6065

For	Kennedy/Jenks/Chilton	Received	10/23/86
Attention	Owen Loshbough	Reported	10/31/86
Address	33301 Ninth Avenue South, Suite 100		
	Federal Way, WA 98003		(K/J/C 6733)

Lab. No.		867360
Source TIP Tacoma, WA	Soil I.D.: Depth:	TP-30 2-3 ft
Date Collected		-
Time Collected		-
Collected by		K/J/C

Analysis	Units	Analytical Results
Lead (Pb) (2)	mg/Kg (1)	2.4

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by atomic absorption spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW-846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst AD Manager Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Soil Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415 362 6065

For	Kennedy/Jenks/Chilton	Received	10/23/86
Attention	Owen Loshbough	Reported	10/31/86
Address	33301 Ninth Avenue South, Suite 100		
	Federal Way, WA 98003		(K/J/C 6733)

Lab. No.		867361
Source TIP Tacoma, WA	Soil I.D.:	TP-30
	Depth:	3.5-4.5 ft
Date Collected		-
Time Collected		-
Collected by		K/J/C

Analysis	Units	Analytical Results
Lead (Pb) (2)	mg/Kg (1)	2.0

Comments: (1) Milligrams per kilogram, wet (as received) weight basis.
(2) Analysis by atomic absorption spectrophotometer.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW-846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst AD Manager Leverett R. Smith

cc: Nathan Graves, K/J/C, Federal Way, WA

Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For	Kennedy/Jenks/Chilton	Received	10/28/86
Attention	Mr. Nathan Graves	Reported	11/4/86
Address	33301 Ninth Avenue South, Suite 100 Federal Way, WA 98003		(K/J/C 6733)

Lab. No.	867539
Source TIP Tacoma, WA	Wood Block Sample #1 (1)
Date Collected	10/27/86
Time Collected	-
Collected by	K/J/C

Analysis	Units	Analytical Results
Total Lead (Pb)*	mg/Kg (2)	650
Total Copper (Cu)*	mg/Kg (2)	36

Note:

(1) In accordance with Mr. Nathan Graves' instructions, wood block submitted was analyzed as follows:

Approximately 2 inches of the wood were cut off the top side (dusty side), divided into 3 pieces, identified as samples Nos. 1, 2 and 3. Sample No. 1, which included dust, was cut into two pieces and one piece of wood was analyzed for total lead and copper as shown above.

(2) Milligrams per kilogram, wet (as received) weight basis.

Comments: Analysis by atomic absorption spectrophotometry.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW–846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst AD

Manager Leverett R. Smith

EP Toxicity Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For	Kennedy/Jenks/Chilton	Received	10/28/86
Attention	Mr. Nathan Graves	Reported	11/4/86
Address	33301 Ninth Avenue South, Suite 100		
	Federal Way, WA 98003		(K/J/C 6733)

Lab. No.	867539
Source TIP Tacoma, WA	Wood Block Sample #1 (1)
Date Collected	10/27/86
Time Collected	-
Collected by	K/J/C

Contaminant	Units	Concentration in Extract
Lead (Pb)*	mg/L	8.7
Copper (Cu)*	mg/L	21

Final pH of extract = 3.4

Note:
(1) In accordance with Mr. Nathan Graves' instructions, wood block submitted was analyzed as follows:

Approximately 2 inches of the wood were cut off the top side (dusty side), divided into 3 pieces, identified as samples Nos. 1, 2 and 3. Sample No. 1, which included dust, was cut into two pieces and one piece of wood was analyzed for lead and copper in E.P. Toxicity extract as shown.

Comments: *Analysis by atomic absorption spectrophotometry.

Reference: "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods," SW-846, Second Edition, 1984, U.S. EPA.

Analyst AD Manager Leverett R. Smith

Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415 362 6065

For Kennedy/Jenks/Chilton
Attention Mr. Nathan Graves
Address 33301 Ninth Avenue South, Suite 100
Federal Way, WA 98003

Received 10/28/86
Reported 11/4/86

(K/J/C 6733)

Lab. No.	867539
Source TIP Tacoma, WA	Wood Block Sample #2 (1)
Date Collected	10/27/86
Time Collected	-
Collected by	K/J/C

Analysis	Units	Analytical Results
Total Lead (Pb)*	mg/Kg (2)	36
Total Copper (Cu)*	mg/Kg (2)	28

Note:

(1) In accordance with Mr. Nathan Graves' instructions, wood block submitted was analyzed as follows:

Approximately 2 inches of the wood were cut off the top side (dusty side), divided into 3 pieces, identified as sample Nos. 1, 2 and 3. Sample No. 2 was freed of dust with a vacuum cleaner, then cut into two pieces. One vacuumed piece of wood was analyzed for total lead and copper as shown above.

(2) Milligrams per kilogram, vacuumed wood weight basis.

Comments: Analysis by atomic absorption spectrophotometry.

Reference: "Test Methods for Evaluating Solid Waste – Physical/Chemical Methods", SW–846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst AD Manager Everett R. Smith

EP Toxicity Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For	Kennedy/Jenks/Chilton	Received	10/28/86
Attention	Mr. Nathan Graves	Reported	11/4/86
Address	33301 Ninth Avenue South, Suite 100		
	Federal Way, WA 98003		(K/J/C 6733)

Lab. No.	867539
Source TIP Tacoma, WA	Wood Block Sample #2 (1)
Date Collected	10/27/86
Time Collected	-
Collected by	K/J/C

Contaminant	**Units**	**Concentration in Extract**
Lead (Pb)*	mg/L	1.3
Copper (Cu)*	mg/L	2.3

Final pH of extract = 3.3

Note:
(1) In accordance with Mr. Nathan Graves' instructions, wood block submitted was analyzed as follows:

Approximately 2 inches of the wood were cut off the top side (dusty side), divided into 3 pieces, identified as samples Nos. 1, 2 and 3. Sample No. 2 was freed of dust with a vacuum cleaner, then cut into two pieces. One vacuumed piece of wood was analyzed for lead and copper in E.P. Toxicity extract as shown.

Comments: *Analysis by atomic absorption spectrophotometry.

Reference: "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods," SW-846, Second Edition, 1984, U.S. EPA.

Analyst AD Manager Everett R. Smith

EP Toxicity Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For Attention Address	Kennedy/Jenks/Chilton Mr. Nathan Graves 33301 Ninth Avenue South, Suite 100 Federal Way, WA 98003	Received Reported	10/28/86 12/3/86 (K/J/C 6733)

Lab. No.	867539
Source TIP Tacoma, WA	Wood Block Sample #2 (1)
Date Collected	10/27/86
Time Collected	-
Collected by	K/J/C

Contaminant	Units	Concentration in Extract (1)
Arsenic (As)	mg/L	<0.01
Barium (Ba)	mg/L	<0.01
Cadmium (Cd)	mg/L	<0.01
Chromium (Cr)	mg/L	<0.05
Mercury (Hg)	mg/L	<0.002
Selenium (Se)	mg/L	<0.01
Silver (Ag)	mg/L	<0.01

Note:
(1) In accordance with Mr. Nathan Graves' instructions, wood block submitted was analyzed as follows:

Approximately 2 inches of the wood were cut off the top side (dusty side), divided into 3 pieces, identified as sample Nos. 1, 2 and 3. Sample No. 2 was freed of dust with a vacuum cleaner, then cut into two pieces. One vacuumed piece of wood was analyzed for lead and copper in E.P. Toxicity extract as shown.

Comments: Analysis by atomic absorption spectrophotometry.

Reference: "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods," SW-846, Second Edition, 1984, U.S. EPA.

Analyst TK, AD   Manager Leverett R. Smith

Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For	Kennedy/Jenks/Chilton	Received	10/28/86
Attention	Mr. Nathan Graves	Reported	11/4/86
Address	33301 Ninth Avenue South, Suite 100 Federal Way, WA 98003		(K/J/C 6733)

Lab. No.	867539
Source TIP Tacoma, WA	Wood Block Sample #3 (1)
Date Collected	10/27/86
Time Collected	-
Collected by	K/J/C

Analysis	Units	Analytical Results
Total Lead (Pb)*	mg/Kg (2)	26
Total Copper (Cu)*	mg/Kg (2)	44

Note:

(1) In accordance with Mr. Nathan Graves' instructions, wood block submitted was analyzed as follows:

Approximately 2 inches of the wood were cut off the top side (dusty side), divided into 3 pieces, identified as sample Nos. 1, 2 and 3. Sample No. 3 was washed with hot water, then cut into two pieces. One washed piece of wood was analyzed for total lead and copper as shown above.

(2) Milligrams per kilogram, wet (as received) weight basis.

Comments: Analysis by atomic absorption spectrophotometry.

Reference: "Test Methods for Evaluating Solid Waste -- Physical/Chemical Methods", SW-846, Second Edition (Revised 1984), and "California Administrative Code Title 22, Div. 4".

Analyst AD Manager Leverett R. Smith

EP Toxicity Analysis Report

Kennedy/Jenks/Chilton
Laboratory Division
657 Howard Street
San Francisco, California 94105
415-362-6065

For Attention Address	Kennedy/Jenks/Chilton Mr. Nathan Graves 33301 Ninth Avenue South, Suite 100 Federal Way, WA 98003	Received Reported	10/28/86 11/4/86 (K/J/C 6733)

Lab. No.	867539
Source TIP Tacoma, WA	Wood Block Sample #3 (1)
Date Collected	10/27/86
Time Collected	-
Collected by	K/J/C

Contaminant	Units	Concentration in Extract
Lead (Pb)*	mg/L	<0.5
Copper (Cu)*	mg/L	0.58

Final pH of extract = 3.5

Note:
(1) In accordance with Mr. Nathan Graves' instructions, wood block submitted was analyzed as follows:

Approximately 2 inches of the wood was cut off the top side (dusty side), cut into 3 pieces and identified as sample Nos. 1, 2 and 3. Sample No. 3 was washed with hot water and cut into 2 pieces. 1 washed piece of wood was analyzed for lead and copper in E.P. Toxicity extract as shown above.

Comments: *Analysis by atomic absorption spectrophotometry.

Reference: "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods," SW-846, Second Edition, 1984, U.S. EPA.

Analyst AD Manager Leverett R. Smith

TMA
Thermo Analytical Inc.

TMA/EAL
2030 Wright Avenue
Richmond, CA 94804-0040

(415) 235-2633
(TWX) 910-382-8132

ANALYSIS REPORT

KENNEDY/JENKS/CHILTON
33301 9TH SO. FEDERAL WAY
WASHINGTON, 98031
ATTN: OWEN LOSHBOUGH

DATE: 10-6-86
Samples Received: 9-19-86
EAL W.O. No. 4602-4
Purchase Order No. 6733

SAMPLE IDENTIFICATION		LEAD
EAL	CUSTOMER	ug/f
4602-4-1	A-1	<1
4602-4-2	A-2	<1
4602-4-3	A-3	<1
4602-4-4	A-4	<1
4602-4-5	A-5	8
4602-4-6	B-1	<1
4602-4-7	B-2	<1
4602-4-8	B-3	<1
4602-4-9	B-4	<1
4602-4-10	B-5	3
4602-4-11	C-0	<1

Harry Gee

Harry Gee
Program Manager

HYG/ltm

APPENDIX D

SUPPORTING DATA - INITIAL REMEDIAL MEASURE

ESI

GENERATORS WASTE PRODUCT QUESTIONNAIRE

Envirosafe Services of Idaho, Inc.
P.O. Box 417, Boise, Idaho 83701
Phone (208) 384-1500

ESI, INC. USE ONLY	
ESI ID NO.	
REGION	

I. GENERAL INFORMATION

Generator Name: TIP Management Inc. Generator U.S. EPA ID: WAD980836266

Facility Address: 5202 South Proctor St. Tacoma, WA

Technical Contact: Nathan Graves, Kennedy/Jenks/Chilton Phone (206) 874-0555

Broker/Business Contact: Thomas K. Anderson Phone (206) 353-3545

II. WASTE PRODUCT DESCRIPTION & CHARACTERISTICS

A. Waste Product Common Name: Lead Contaminated Soil/Slag

1. Process Generating Waste:

B. Hazardous Properties:

1. U.S. EPA Hazardous Material? ☑ Yes ☐ No
2. U.S. EPA Hazardous Code(s): D008

c. Is Waste Product: ☐ Explosive ☐ Reactive ☐ Radioactive ☐ Pyrophoric ☐ Etiological ☐ Shock Sensitive

C. Physical Properties at 70°F:

1. **Physical State:** ☑ Solid ☐ Sludge ☐ Liquid ☐ Powder
   Any free liquids at 70°F ☐ Yes ☐ No
2. **Layers:** ☐ Multilayered ☐ Bi-Layered ☑ Homogenous
3. **Flash Point (Closed Cup Only):** ☐ <70°F ☐ 70-100°F ☐ 101-139°F ☐ 140-200°F ☑ No Flash ☐ Exact ____
4. **Viscosity:** Similar to: ☐ Water ☐ Motor Oil ☐ Honey ☑ Other Solid

D. 1. **Density:**
Liquid ☐ ____ lbs/gallon
Solid ☑ 131 lbs/cubic ft.
Any debris in waste: ☐ Yes ☑ No
Explain ____

2. **Solids:** ☐ By Weight ☑ By Volume
Total 100%

3. **Odor:** ☑ None ☐ Strong ☐ Mild
Describe: ____

4. **Ph.** ☐ <2 ☐ 2-5 ☑ 5.1-9 ☐ 9.1-12.5 ☐ >12.5 ☐ Exact ____

E. Chemical Composition (Account for 100% of total):

Component	Range
Heavy Metals	25 – 30 %
Fill/Soil/Slag	70 – 75 %
	– %
	– %
	– %
	– %
	– %
	– %
	– %
	– %
	– %
	– %

Metals:
____ Total (PPM)
✓ EPA Extraction Procedure (mg/L)

Metal	Value
Arsenic (As)	<0.1
Barium (Ba)	<1
Cadmium (Cd)	0.01
Chromium (Cr)	0.03
Mercury (Hg)	<0.1
Lead (Pb)	580
Selenium (Se)	<0.1
Silver (Ag)	<0.1

Non Present ☐

Pesticides:
Endrin ____
Lindane ____
Methoxychlor ____
Toxaphene ____
2,4-D ____
2,4,5-TP ____
Non Present ☑

Reactives & Other Wastes (PPM):
Cyanides ____ Dioxin ____
Sulfides ____ Other ____
No ☑

F. **Shipping and Handling Information:**

1. D.O.T. Hazardous Material? ___ Yes ___ No
2. Proper D.O.T. Shipping Name: Hazardous waste, Solid, N.O.S.
3. D.O.T. ID Number: NA 9189
4. D.O.T. Hazard Class: ORM-E
5. Method of Shipment: ✓ Drum and/or ✓ Bulk ____ Other
6. D.O.T. Shipping Container 17E or 17H / lined, covered dump truck
7. Projected Volume: ____ Tons ____ Gallons 10 Cubic Yards ____ Other
   Per ✓ One Time ____ Week ____ Month ____ Quarter ____ Year

Comments: Material must be disposed in a double lined cell, eligible to receive CERCLA waste.

III. GENERATOR CERTIFICATION STATEMENT

I hereby certify that as an authorized representative of the generator named above, all information submitted in this and all the attached documents is true and accurate. Analysis of the waste was conducted in accordance with the approved test methods in 40 CFR 261 on a representative sample as defined in 40 CFR 261.20. To the best of my knowledge, all known (40 CFR 261) and suspected hazardous components have been included in this documentation. All material and packaging will comply with all current regulations.

Signature Thomas K Anderson Title President Date 11/24/86

ESI, INC. USE ONLY

Reviewed by:	Date Approved:	Date Denied:	Classification:
Treatment:			WDS Code:

ESI
Envirosafe Services of Idaho, Inc.
P.O. BOX 936
MOUNTAIN HOME, IDAHO 83647
TELEPHONE (208) 587-8434

INDUSTRIAL WASTE MATERIAL DISPOSAL ORDER

D. O. NUMBER 2520

THIS NUMBER MUST APPEAR ON ALL CONTAINERS, BILLS OF LADING, MANIFESTS AND CORRESPONDENCE.

DATE: December 12, 1986
GENERATOR NO.
ACCOUNT NO.

TIP Management, Inc.
5202 South Proctor St.
Tacoma, WA

"GENERATOR"

Same

"PLANT"

ESTIMATED DELIVERY/SHIP DATE: To be Scheduled

FACILITY ADDRESS: ESI, Inc. 10.5 NW of Grandview, Idaho 83624

GENERATOR CONTACT AND TELEPHONE NO.: Thomas R. Ande rson 206-383-3545

GENERATOR EPA ID NO.: WAD 980 836 266

TRANSPORTER EPA ID NO.: Transportation to be provided by generator

FACILITY EPA ID NO.: IDD 073 114 654

ITEM #	EPA WASTE ID #	DOT WASTE ID #	ESTIMATED QUANTITY	GENERAL DESCRIPTION OF INDUSTRIAL WASTE MATERIAL	UNIT DISPOSAL PRICE
1	D008	NA9189	10 yrds	Lead Contaminated Soil WPQ #: 0125T-X	$ 100.00/ton
				Idaho State Hazardous Waste Tax	$ 0.01/lb

Cashiers Check to accomopany the load for $1,200.00.

Idaho State Hazardous Waste Trip Permit fee of $20.00/truckload must be paid by each vehicle priior to receipt of material at ESII.

Transporter must comply with ESII routing and scheduling as per the ESII Compliance Manual.

REFER ALL INQUIRIES AND CORRESPONDENCE RELATIVE TO THIS ORDER TO ATTENTION OF

Russ Smith
SALES REPRESENTATIVE

FOR ENVIROSAFE SERVICES OF IDAHO, INC.

BY:

TITLE: Vice President & General Mgr.

DATE:

ALL PRICING QUOTED HEREIN SHALL REMAIN FIRM FOR NINETY (90) DAYS FROM THE DATE HEREOF; THEREAFTER QUOTED PRICING IS SUBJECT TO CHANGE.

ACKNOWLEDGEMENT

GENERATOR HEREBY ACKNOWLEDGES ACCEPTANCE OF THIS DISPOSAL ORDER. GENERATOR HAS READ THE TERMS AND CONDITIONS APPEARING ON THE REVERSE SIDE OF THIS DISPOSAL ORDER AND AGREES TO BE BOUND BY THE PROVISIONS THEREOF.

DATE: 12/16/ 1986 BY: Thomas R Anderson

GENERATOR: Tacoma Industrial Properties TIP Management Inc General Partner TITLE President

ORIGINAL

CROWLEY ENVIRONMENTAL SERVICES CORP.
3400 E. Marginal Way S.
Seattle, WA 98134 206-682-4898

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. WAD 980836266 | Manifest Document No. 00001 | 2. Page 1 of 1 | Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
T.I.P. MANAGEMENT, INC.
C52259 1123 PORT OF TACOMA ROAD, TACOMA WA 98401

4. Generator's Phone (206) 284 9611

A. State Manifest Document Number
B. State Generator's ID

5. Transporter 1 Company Name	6. US EPA ID Number	
DALT TRUCKING INC.	OHD 009865825	C. State Transporter's ID
		D. Transporter's Phone 216 533 9841
7. Transporter 2 Company Name	8. US EPA ID Number	E. State Transporter's ID
		F. Transporter's Phone
9. Designated Facility Name and Site Address	10. US EPA ID Number	G. State Facility's ID
ENVIROSAFE SERVICES OF IDAHO 10.5 NW OF GRANDVIEW IDAHO	IDD 073114654	H. Facility's Phone 208 587 8434

	HM	11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a.		HAZARDOUS WASTE SOLID N.O.S. ORM-E NA 9189	1	6	US540		D008
b.							
c.							
d.							

J. Additional Descriptions for Materials Listed Above
LEAD CONTAMINATED SOIL / SLAG
WPQ # 0115T-X

K. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
D.O.T. [illegible] Waste to be disposed in unit eligible for CERCLA waste.

16. **GENERATOR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national governmental regulations.

Unless I am a small quantity generator who has been exempted by statute or regulation from the duty to make a waste minimization certification under Section 3002(b) of RCRA, I also certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and I have selected the method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment.

Printed/Typed Name	Signature	Month	Day	Year
Thomas R. Anderson President	Thomas R Anderson	12	18	96

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
R I CHAINEY	RL Chaney	12	18	96

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name	Signature	Month	Day	Year

TIP MANAGEMENT, INC.
CS 2259
1123 Port of Tacoma Road
Tacoma, WA 98401

5 January 1987

Envirosafe Services of Idaho, Inc.
P. O. Box 417
Boise, ID 83701

Attention: Ms. Carol Price

Subject: Correction to Uniform Hazardous Waste Manifest
D.O. Number 2520
WPQ#: 0125T-X

Dear Ms. Price:

With regard to the uniform hazardous waste manifest identified below:

Generators ID No.	WAD 980836266
Manifest Document No.	00001
D.O. Number	2520
WPQ#:	0125T-X

Please note the following corrections:

Item H - Facility's Phone. This number should be changed to "208-834-2275".

Item 12 - Containers, Type. This entry should be changed to "DT".

Item 13 - Total Quantity. This entry should be changed to "20,660".

Item 14 - Unit, Wt/vol. This entry should be "LBS".

We understand that you have already corrected the manifest to reflect these changes/additions.

Please calll us at (206) 383-3545 if you have any questions.

Very truly yours,

TIP MANAGEMENT, INC.

Thomas R. Anderson

Thomas R. Anderson
President

APPENDIX E

AQUATIC FATE AND MOBILITY OF SELECTED COMPOUNDS

APPENDIX E

AQUATIC FATE AND MOBILITY OF SELECTED COMPOUNDS[1]

Arsenic

The fate of arsenic in the aquatic environment is complex, depending on a number of factors including Eh, pH, metal sulfide and sulfide ion concentrations, presence of phosphorus minerals, iron concentration, temperature, salinity, and distribution and composition of the biota. It appears that, in most cases, the sediment is the major sink for arsenic, but that mobilization by bacteria and other benthic organisms returns much of this arsenic to the cycle. Much, if not most, of the arsenic introduced to the aquatic ecosystem is eventually transported in solution to the oceans.

Lead

Sorption processes are effective in reducing the concentration of soluble lead in natural water and result in enrichment of bed sediments near the source. The equilibrium solubility of lead with carbonate, sulfate, and sulfide is low. In severely contaminated areas, precipitation may be important in controlling the mobility of this metal, but under most circumstances, sorption predominates. The tendency for lead to form complexes with naturally occurring organic materials (e.g., humic and fulvic acids) increases its adsorptive affinity for clays and other mineral surfaces. Bioaccumulation of weakly sorbed lead phases may result in remobilization. Lead is generally not biomagnified; bioconcentration factors tend to decrease as the trophic level increases.

Zinc

Most of the zinc introduced into the aquatic environment is partitioned into the sediments by sorption onto hydrous iron or manganese oxides, clay minerals, and organic materials. The efficiency of these materials in removing zinc from solution varies according to their concentrations, pH, Eh, concentrations of ligands, and the concentration of zinc. Precipitation of the sulfide is an important control on the mobility of zinc in reducing environments. Under aerobic conditions, precipitation of zinc compounds is probably important only where zinc is present in high concentrations. Zinc is bioaccumulated, which is to be expected in view of the fact that it is an essential nutrient. Although the biota appear to be a minor reservoir of zinc relative to the sediments, biological activity can affect the mobility of zinc in the aquatic environment.

---

[1] From "Water-Related Environmental Fate of 129 Priority Pollutants", EPA - 440/4-79-029 a, b, 1979

Copper

Copper exhibits a very complex behavior in the aquatic environment. Sorption processes are probably most important in controlling copper distribution and include: coprecipitation/sorption by hydrous iron and manganese oxides; ion exchange in the crystal lattice structure of carbonate minerals; adsorption to clays and other mineral surfaces; and adsorption to organic solids. Sorption appears to be more important than precipitation in most circumstances.

Both organic and inorganic ligands complex copper. Under normal conditions, most of the copper in solution is in complexed form. These complexes alter the behavior of copper to the extent that it is generally more soluble in natural waters than would be predicted by conventional analysis employing thermodynamic equilibria, and it has a greater adsorptive affinity for hydrous solids than uncomplexed forms.

Cadmium

Cadmium is mobile in the aquatic environment relative to most other heavy metals. It occurs as the divalent metal cation in acidic and circumneutral water, and it forms complexes with organic material in highly polluted waters and complexes with carbonate and hydroxide ions at higher pH values. The formation of complexes with humic substances is important because these complexes are more easily assimilated by the sediments than the hydrated divalent cation. Sorption processes are the most important factor in reducing the aquatic load and transport velocity of cadmium. Cadmium is less mobile in alkaline than in acidic waters. Sorption to organic materials and clay minerals, co-precipitation with hydrous metal oxides and substitution in carbonate minerals all affect the distribution and fate of cadmium. Cadmium, although highly toxic, is concentrated by all organisms.

APPENDIX F

TOXICOLOGY OF SELECTED COMPOUNDS

APPENDIX F

TOXICOLOGY OF SELECTED COMPOUNDS

Arsenic

Arsenic is a naturally occurring element often referred to as a metal, although chemically classified as a metalloid.

The typical systemic manifestations of arsenic poisoning due to ingestion usually include gastrointestinal disturbances. Death, which is generally preceded by restlessness, convulsions, or coma, may result from cardiac failure. In subacute poisoning, symptoms are less intense. Although few human epidemiologic studies have provided evidence of arsenic-induced reproductive or teratogenic effects, several studies have shown that sodium arsenate induces several developmental malformations in embryo chicks, hamsters, rats and mice.

Arsenic compounds have caused chromosomal damage in a number of biological systems, alerting toxicologists to the possibility of arsenic-induced mutagenesis.

There is evidence that inorganic arsenic is a skin carcinogen in man (EPA 1980a) and significant evidence that it is a lung carcinogen.

Lead

Lead occurs ubiquitously in the environment. Surface waters worldwide contain lead at low concentrations in the range of 1 to 10 ug/L. Lead can enter drinking water distribution systems in areas where highly acidic water with low hardness and alkalinity dissolve lead from rocks in aquifers or from lead pipes and fittings. The dietary contribution of lead is approximately 200 ug/day for adults and 40 to 200 ug/day for children (aged three months to nine years). Lead concentrations in ambient air ranges from about 0.1 ug/m^3 in rural areas to 10 ug/m^3 in areas of heavy traffic (EPA, 1980b).

Lead is accumulated in the human body; however, the amount of lead that can be tolerated without eliciting adverse effects has not been established. Acute symptoms of lead poisoning include a burning sensation in the mouth, severe thirst, inflammation of the gastrointestinal tract accompanied with vomiting and diarrhea (Sittig, 1981). Chronic exposure to lead can result in the loss of appetite, nausea, vomiting, severe abdominal pain, paralysis, mental confusion, visual disturbances, anemia, and convulsions (Sittig, 1981).

There is a lack of scientific evidence to show that lead is a teratogenic, mutagenic, or carcinogenic agent in humans (EPA 1980b).

Zinc

Zinc metal occurs in nature in the sulfide, oxide, or carbonate forms (Sittig, 1981). It is an essential nutrient for human and animal metabolism; an acceptable daily intake for zinc in food has not been established. Based on organoleptic effects, the secondary drinking water standard for zinc has been established at 5.0 mg/L. At zinc levels of 5.0 mg/L or greater, a bitter taste is detected by some people. Zinc is not considered a carcinogenic agent. Studies on experimental animals and humans administered with zinc therapeutically and exposed to zinc occupationally, indicate that it can be tolerated over a long period of time. The most commonly reported effect of high-level exposure is interference with copper metabolism, resulting in a reversible copper deficiency condition. There is an inadequate toxicological data base for evaluating water quality criteria for zinc due to deficiencies in the experimental studies reported in the literature (EPA, 1980c).

Copper

Copper is widespread in the earth's crust, and the extensive use of copper and its compounds by man since prehistoric times has added copper to the environment and the ecosystem in highly variable concentrations.

Most copper absorption in man takes place in the stomach and the duodenum. It is rapidly transported to the blood serum and taken up by the liver. Approximately 40 to 60 percent of dietary copper is absorbed, the remainder being fecally excreted.

Copper toxicity produces a metallic taste in the mouth, nausea, vomiting, epigastric pain, diarrhea, and depending on the severity, jaundice, hemolysis, hemoglobinuria, hematuria, and oliguria. In severe cases, anuria, hypotension, and coma can occur.

A non-fatal type of copper poisoning has symptems of laryngitis, bronchitis, intestinal colic with catarrh, diarrhea, general emaciation, and anemia.

There is some evidence that copper may increase the mutagenic activity of other compounds, including triose reductone and ascorbic acid.

There is very little evidence in literature to suggest that copper has a teratogenic effect in either animals or humans. Copper itself has not been shown to be mutagenic. There is very little evidence in literature to suggest that copper has a carcinogenic effect in either animals or humans. (EPA, 1980d).

Cadmium

Cadmium is a biologically non-essential, non-beneficial element of high toxicity potential. The major route of cadmium exposure to humans is dietary. Drinking water normally does not contain cadmium in concentrations greater than one ug/L, accounting for less than ten percent of the total daily absorption for the majority of the U.S. population. Airborne occupational exposure is another recognized route for human exposure to cadmium. It is absorbed into the body through the gastrointestinal tract, concentrating in the liver, kidneys, pancreas, and thyroid glands of humans and animals (Sittig, 1981).

Cadmium has been shown to be teratogenic in several rodent species following the administration of large parental dosages (4-12 mg/kg). Studies investigating the mutagenic potential of cadmium ae inconsistent.

The International Agency for Research on Cancer (IARC, 1982) has classified cadmium as a chemical for which there is sufficient evidence of carcinogenicity in animals, however, inadequate data exists for humans. (EPA, 1980e).

References

U.S. Environmental Protection Agency, Office of Water Regulations and Standards, 1980a. "Ambient Water Quality Criteria for Arsenic", Washington, D.C.

U.S Environmental Protection Agency, Office of Water Regulations and Standards, 1980b. "Ambient Water Quality Criteria for Lead", Washington, D.C.

U.S. Environmental Protection Agency, Office of Water Regulations and Standards, 1980c. "Ambient Water Quality Criteria for Zinc", Washington, D.C.

U.S. Environmental Protection Agency, Office of Water Regulations and Standards, 1980d. "Ambient Water Quality Criteria for Copper", Washington, D.C.

U.S. Environmental Protection Agency, Office of Water Regulations and Standards, 1980e. "Ambient Water Quality Criteria for Cadmium", Washington, D.C.

Sittig, Marshal, ed. 1981. "Handbook of Toxic and Hazardous Chemicals". Noyes Publications, Park Ridge, New Jersey.

APPENDIX G

NCP POTENTIALLY APPLICABLE OR
RELEVANT AND APPROPRIATE REQUIREMENTS

APPENDIX G

NCP POTENTIALLY APPLICABLE OR
RELEVANT AND APPROPRIATE REQUIREMENTS

1. EPA's Office of External Affairs, Section 404 (b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR Part 230).

2. EPA's Office of Solid Waste administers, inter alia, the Resource Conservation and Recovery Act of 1976, as amended (Publ. L. 94-580, 90 Stat 95, 42 U.S.C. 6901 et seq.). Potentially applicable or relevant requirements pursuant to that Act are:

   A. Open Dump Criteria - Pursuant to RCRA Subtitle D criteria for classification of solid waste disposal facilities (40 CFR Part 257). Note: Only relevant to nonhazardous wastes.

   b. In most situations, Superfund wastes will be handled in accordance with RCRA Subtitle C requirements governing standards for owners and operators of hazardous waste treatment, storage, and disposal facilities: 40 CFR Part 264, for permitted facilities, and 40 CFR Part 265, for interim status facilities.

      o Groundwater Protection (40 CFR 264.90-264.109)

      o Groundwater Monitoring (40 CFR 265.90-265.94)

      o Closure and Post Closure (40 CFR 264.110-264.120, 265.110-265.112)

      o Waste Piles (40 CFR 264.250-264.269, 265.250-265.258)

      o Landfills (40 CFR 264.300-264.339, 265.330-265.316)

3. EPA's Office of Air and Radiation administers several potentially applicable or relevant and appropriate statutes and regulations including:

   a. Clean Air Act (42 U.S.C. 7401).

      o National Ambient Air Quality Standards for total suspended particulates (40 CFR Parts 50.6-50.7)

4. EPA's Office of Water administers several potentially applicable or relevant and appropriate statutes and regulations including:

   a. Section 14.2 of the Public Health Service Act as amended by the Safe Drinking Water Act as amended (Pub. L.93-523, 88 Stat. 1660, 42 U.S.C. 300f et. seq.).

- o Maximum Contaminant Levels (for all sources of drinking water exposure). (40 CFR 141.11-141.16)

b. Clean Water Act as amended (Pub. L. 92-500, 86 Stat. 816, 33 U.S.C. 1251 et. seq.).

- o Requirements established pursuant to sections 301, 302, 303, (including State water quality standards), 306, 307, (including Federal pretreatment requirements for discharge into a publicly owned treatment works), and 403 of the Clean Water Act. (40 CFR Parts 131.400-469).

5. Other Federal Requirements

a. OSHA requirements for workers engaged in response activities are codified under the Occupational Safety and Health Act of 1970 (29 U.S.C. 651). The relevant regulatory requirements are included under:

- o Occupational Safety and Health Standards (General Industry Standards) (29 CFR Part 1910).
- o The Safety and Health Standards for Federal Service Contracts (29 CFR Part 1926).
- o Recordkeeping, reporting, and related regulations (29 CFR Part 1904).

b. Historic Sites, Buildings, and Antiquities Act (16 U.S.C. 461).

c. National Historic Preservation Act, 16 U.S.C. 470. Compliance with NEPA required pursuant to 7 CFR Part 650. Protection of Archaeological Resources: Uniform Regulations-Department of Defense (32 CFR Part 229, 229.4). Department of the Interior (43 CFR Part 7, 7.4).

d. DOT Rules for the Transportation of Hazardous Materials, 49 CFR Parts 107, 171.1-171.500. Regulation of activities in or affecting waters of the United States pursuant to 33 CFR Parts 320-329. The following requirements are also triggered by Fund-financed actions:

- o Endangered Species Act of 1973, 16 U.S.C. 1531. (Generally, 50 CFR Parts 81, 225, 402). Wild and Scenic Rivers Act, 16 U.S.C. 1271.
- o Fish and Wildlife Coordination Act, 16 U.S.C. 661 note.
- o Fish and Wildlife Improvement Act of 1978, and Fish and Wildlife Act of 1956, 16 U.S.C. 742a note.

- o Fish and Wildlife Conservation Act of 1980, 16 U.S.C. 2901. (Generally, 50 CFR Part 83).

- o Coastal Zone Management Act of 1972, 16 U.S.C. 1451. (Generally, 15 CFR Part 930 and 15 CFR 923.45 for Air and Water Pollution Control Requirements).

Other Federal Criteria, Advisories, Guidance, and State Standards to be Considered:

1. Federal Criteria, Advisories, and Procedures

   a. Federal Water Quality Criteria (1976, 1980, 1984). Note: Federal Water Quality Criteria are not legally enforceable. State water quality standards are legally enforceable, and are developed using appropriate aspects of Federal Water Quality Criteria. In any cases, State Water Quality Standards do not include specific numerical limitations on a large number of priority pollutants. When neither State standards nor MCLs exist for a given pollutant, Federal Water Quality Criteria are pertinent and, therefore, are to be considered.

   b. Health Effects Assessments (HEAs).

   c. Recommended Maximum Concentration Limits (RMCLs).

   d. OSHA health and safety standards that may be used to protect public health (nonworkplace).

   e. Health Advisories, EPA Office of Water.

   f. Public health basis for the decision to list pollutants as hazardous under section 112 of the Clean Air Act.

   g. EPA's Groundwater Protection Strategy.

   h. New Source Performance Standards for Storage Vessels for Petroleum Liquids.

   i. Advisories issued by FWS and NWFS under the Fish and Wildlife Coordination Act.

   j. Executive Orders related to Floodplains (11988) and Wetlands (11990) as implemented by EPA's August 6, 1985, Policy on Floodplains and Wetlands Assessments for CERCLA Actions.

   k. Waste load allocation procedures, EPA Office of Waste.

   l. Federal sole source aquifer requirements.

2. State Standards

   a. State Implementation Plans and Delegated Programs Under Clean Air Act.

   b. State of Washington, Final Cleanup Policy.

   c. Requirements of authorized (Subtitle C of RCRA) State Hazardous Waste Programs.

   d. All other State requirements, not delegated through EPA authority.

   e. Approved State NPDES programs under the Clean Water Act.

   f. Approved State UIC programs under the Safe Drinking Water Act. Note: Many other state and local requirements could be pertinent. Forthcoming guidance will include a more comprehensive list.

3. USEPA RCRA Guidance Documents

   a. Test Methods for Evaluating Solid Waste:

      o Solid Waste Leaching Procedure Manual.

      o Methods for the Prediction of Leachate Plume Migration and Mixing.

      o Hydrologic Evaluation of Landfill Performance (HELP) Model Hydrologic Simulation on Solid Waste Disposal Sites.

      o Procedures for Modeling Flow Through Clay Liners to Determine Required Liner Thickness.

      o Test Methods for Evaluating Solid Wastes.

      o A Method for Determining the Compatibility of Hazardous Wastes.

      o Guidance Manual on Hazardous Waste Compatibility.

   b. EPA's RCRA Design Guidelines:

      o Surface Impoundments, Liner Systems, Final Cover and Freeboard Control.

      o Waste Pile Design - Liner Systems.

      o Land Treatment Units.

      o Landfill Design - Liner Systems and Final Cover.

c. Technical Resource Documents (TRDs):

- o Evaluating Cover Systems for Solid and Hazardous Waste.
- o Hydrologic Simulation of Solid Waste Disposal Sites.
- o Landfill and Surface Impoundment Performance Evaluation.
- o Management of Hazardous Waste Leachate.
- o Guide to the Disposal of Chemically Stabilized and Solidified Waste.
- o Closure of Hazardous Waste Surface Impoundments.
- o Hazardous Waste Land Treatment.
- o Soil Properties, Classification, and Hydraulic Conductivity Testing.

d. Permitting Guidance Manuals:

- o Permit Applicant's Guidance Manual for Hazardous Waste Land Treatment, Storage, and Disposal Facilities.
- o Permit Writer's Guidance Manual for Hazardous Waste Land Treatment, Storage, and Disposal Facilities.
- o Permit Writer's Guidance Manual for Subpart F.
- o Permit Applicant's Guidance Manual for the General Facility Standards.
- o Waste Analysis Plan Guidance Manual.
- o A Guide for Preparing RCRA Permit Applications for Existing Storage Facilities.
- o Guidance Manual on Closure and Postclosure Interim Status Standards.

4. USEPA Office of Water Guidance Documents

a. Water Quality Guidance Documents:

- o Technical Support Manual: Waterbody Surveys and Assessments for Conducting Use Attainability Analyses (1983).
- o Water-Related Environmental Fate of 129 Priority Pollutants (1979).
- o Water Quality Standards Handbook (1983).

- o Technical Support Document for Water Quality-Based Toxics Control.

b. NPDES Guidance Documents:

- o NPDES Best Management Practices Guidance Manual (June 1981).

- o Case studies on Toxicity Reduction Evaluation (May 1983).

c. Pretreatment Guidance Documents:

- o 304(g) Guidance Document Revised Pretreatment Guidelines (3 Volumes)

5. USEPA Manuals for the Office of Research and Development

a. SW 846 methods-laboratory analytic methods.

b. Lab protocols developed pursuant to Clean Water Act Section 304(h).

APPENDIX H

TECHNOLOGY COST CALCULATIONS

APPENDIX H

TECHNOLOGY COST CALCULATIONS

Technological Activity	Cost Date	Source	Base Cost Estimate	Cost Modifiers	Present Cost	Comments
Grading	1982	ELI	\$4720/acre	1.4 Health & Safety Factor 1.2 Cost Index Ratio	\$7552/acre	Does not include fill material cost
Soil Excavation	1985	EPA	\$2.00/yd^3	3.0 Health & Safety Factor	\$6.00/yd^3	
Backfill Material	1986	Verbal Quote	\$3.00/yd^3	-	\$3.00/yd$_3$	Soil costs include delivery
Topsoil	1985	EPA	\$10.30/yd^3	-	\$10.30/yd^3	
Revegetation						
Capital	1982	ELI	\$1500/acre	1.2 Cost Index Ratio	\$1800/acre	Includes hydro-seeding & mulching
O&M	1982	ELI	\$800/acre/yr	1.2 Cost Index Ratio	\$960/acre/yr	
Capping						
Asphalt						
Capital	1986	Verbal Quote	\$40,900 lump sum	-	\$40,900 lump sum	4"Base, 4" Asphalt
O&M	1982	ELI	\$700/yr	1.2 Cost Index Ratio	\$840/yr	
Concrete						
Capital	1986	Verbal Quote	\$11.25/yd^2	-	\$11.25/yd^2	4" with sealed seams
O&M	1982	ELI	\$700/yr	1.2 Cost Index Ratio	\$840/yr	
RCRA Cap						
Capital	1985	EPA	\$49/yd^2	-	\$49/yd^2	Includes 3" top soil,1' sand, '1 compacted clay, 30-mil HPDE liner, 2' compacted clay, filter fabric & quality testing
O&M	1982	ELI	\$700/yr + \$800/acre/yr	1.2 Cost Index Ratio	\$840/yr + \$960/acre/yr	

APPENDIX H

TECHNOLOGY COST CALCULATIONS, CONT.

Technological Activity	Cost Date	Source	Base Cost Estimate	Cost Modifiers	Present Cost	Comments
Bentonite Admix.						
Capital	1985	EPA	$\$10/yd^2$	-	$\$10/yd^2$	Includes mixing & placing
Synth. Membranes						
Non-reinforced	1985	EPA	$\$11/yd^2$	-	$\$11/yd^2$	Inc. installation
Reinforced	1985	EPA	$\$13/yd^2$	-	$\$13/yd^2$	but not earthwork
Transport						
Soils	1986	Verbal Quote	$38/ton	-	$\$68.4/yd^3$	$1.8\ tons/yd^3$
Disposal						
Soils/Dust/Bldg	1986	Verbal Quote	$114/ton	-	$\$205.2/yd^3$	At Arlington
Soils/Dust/Bldg	1986	Verbal Quote	$14/ton	-	$\$25.2/yd^3$	At sanitary landfill
Ind. Vacuuming	1986	Verbal Quote	$30,000 lump sum	-	$30,000 lump sum	Does not include disposal
Bldg. Demolition	1986	Average Bid	$17,300 lump sum	-	$17,300 lump sum	Complete demolition
Chemical Dust Suppressant	1985	EPA	$800/acre	-	$800/acre	
Solidification						
Cement-based	1985	EPA	$75/ton	-	$\$135/yd^3$	Does not include secondary containment or final
Lime-based	1985	EPA	$40/ton	-	$\$72/yd^3$	transport & disposal

APPENDIX H

TECHNOLOGY COST CALCULATIONS, CONT.

Technological Activity	Cost Date	Source	Base Cost Estimate	Cost Modifiers	Present Cost	Comments
Thermoplastic	1985	EPA	$45/ton	-	$81/yd^3$	Includes secondary containment but not final transport & disposal
Surface Micro-encapsulation	1985	EPA	$90/ton	-	$162/yd^3$	Does not include final transport & disposal
Glassification	1982	EPA	$85/ft^3$	1.2 Cost Index Ratio	$2754/yd^3$	
Recycling at Asarco	1986	Verbal Quote	$200/ton	-	$360/yd^3$	Does not include transport
Underground Tank Removal	1986	Bid	$2800 lump sum	-	$2800 lump sum	

Sources:

EPA - U.S. Environmental Protection Agency, 1985. Remedial Action at Waste Disposal Sites.

ELI - Environmental Law Institute, 1985. Compendium of Costs of Remedial Technologies at Hazardous Waste Sites.

APPENDIX I

SOUTH TACOMA INDUSTRIAL WASTE SURVEY - 1982

SOUTH TACOMA

INDUSTRIAL WASTE SURVEY

1982

by: Doug Pierce
Steve Rogers

health

ENVIRONMENTAL HEALTH

DOUG PIERCE, R.S.
Solid Waste Program Manager
591-6571

TACOMA-PIERCE COUNTY HEALTH DEPARTMENT

3629 SOUTH D ST TACOMA, WASHINGTON 98408

uth Tacoma as an automobile production center. Leonard began his operation in the old South Tacoma Garage at S. 54th and Washington. This facility was primarily a dealership for White Steamers which became an auto rental agency in 1907 when fire swept through the dealership, burning one of the cars. Leonard later moved to a new building in the 5600 block of South Tacoma Way. This new location served as both a garage and automobile assembly plant. Parts for Currier, Metz and Stoddard-Dayton cars were shipped in by boxcar and assembled in the South Tacoma plant. In 1916 Leonard obtained a Ford agency which Tom Mallon bought from the Leonard family during the Great Depression.

In 1928 the dominant feature of the South Tacoma area was still the Northern Pacific Railroad shops. These shops were the largest Northern Pacific facility west of Minneapolis. With approximately 135 acres of land and 48 acres of roofing, it was the largest employer in South Tacoma. The employment of the NPRR yards extended to related industries which settled in the immediate area as suppliers of the NP.

Griffen Wheel bought their plant from the American Foundry Company in 1897. As a major supplier of wheels, brass and lead castings to the NP, Griffen Wheel grew with the rail yard. Slag and tailings from the foundry were deposited on the west side of the foundry.

At 5402 South Washington there was a firm called Specialty Foundry. While very little is known about this business, one might assume they had slag and tailing piles as well as some other industrial wastes.

While the Northern Pacific had Griffen Wheel (and perhaps Specialty Foundry) doing some facets of their metal work, the NP shops had their own blacksmith nd casting facilities. This reportedly included a zinc plant which did zinc casting and galvinizing work.

The NPRR shops of 1928 were the major facilities for building and repairing passenger coaches and freight cars. These were also the primary shops for the steam locomotives. Locomotives were repaired and cleaned at this location. A former employee recalled two cleaning tanks, one presumably hot caustic and the other a cold solvent tank. These tanks were roughly 20' x 50' x 12'. They were dug into the ground and lined with cement. While the exact contents of these tanks was not known by any of the former employees contacted during this study, the contents have been inferred from the characteristics of these dip vats. It is not known how often, if ever, these vats were cleaned and/or changed.

An inventory of businesses from the Tacoma city directory of 1928 listed roughly 100 commercial entities in the South Tacoma Channel area. Roughly 50% of those entities were engaged in the automobile and/or petroleum products distribution. Even in 1928, South Tacoma had a district "auto row" located between South 56th and South 60th on Union Ave. (now called South Tacoma Way). This section of South Tacoma Way had retained this identity to the present. Service stations, which are presumed to have been primarily fuel distributors, were scattered throughout the South Tacoma Channel area.

It has only been during the past few years that our socity has realized the potentially harmful effects of the various oils and solvents used in the automotive maintenance business. In 1928 there were 22 businesses involved in automobile sales and service between South 56th and South 70th on Union Ave. Such a concentration of business indicated this segment of South Tacoma Way could be a potential "hot spot" of solvent contamination.

In the northern end of the South Tacoma Channel there were two large oil producer/distributors. These were the Texas Co. oil producers of 3007 S. Pine,

,is stain is water based, however, they previously used an "asphalt varnish and mineral spirits" stain. The staining machine is cleaned by letting the stain run onto the ground. This runoff could be an historic pollution problem. Another finishing company has extremely concentrated solvent vapors but no apparent on-site pollution. The primary concern at this shop is the small amount of sludge which goes into the dumpster.

Miscellaneous

Of the 13 firms which did not fit into any of the previous categories, only one had practices of concern. A janitorial service receives free samples of various spot removers, detergents and floor strippers. If these samples don't perform adequately, they are thrown into the dumpster. Some of the carpet spot removers contain carbon tetrachloride, perchlorethylene, trichlorethylene and petroleum naphtha.

Conclusions

The primary objective of this study was to determine what, if any, identifiable practices, either past or present, could be found to explain the contamination of the Tacoma aquifer. The two path approach was used in an effort to help explain the presence of that contamination.

The historical study emphasized the types of industries in the area. It was anticipated that such a study might indicate specific areas which might be historical sources of contamination. While the presence of a potential contributor is not an indication of guilt, it is reasonable to monitor these areas for signs of elevated chemical contamination.

As previously stated, the Tacoma industrial survey was undertaken with the intent of assessing how present day practices might be impacting the Tacoma aquifer. One severe limitation of the survey was the dependence on the open and honest reporting of present practices by the commercial entities. Because this study was information gathering rather than enforcement oriented, the response of the South Tacoma industrial community was highly cooperative.

At the time the survey was begun, several businesses were under scrutiny by the Environmental Protection Agency and the Washington State Department of Ecology. It was determined that contacting these firms would be redundant and, most likely, fruitless. These firms were, therefore, exempt from the TPCHD study.

The study of present practices served a dual prupose. First, this survey was educational for many of the firms which did not realize how easily they could adversely impact the aquifer through carelessness or poor housekeeping. Secondly, the survey allowed the Health Department to gauge the quantity of wastes regularly mishandled in the South Tacoma industrial area.

There were approximately 150 firms surveyed which appeared to be potential contributors to groundwater contamination. It must be emphasized that a "potential contributor" might have less solvent in stock than many private homes, yet the possibility exists. The survey indicated that almost 10% of the "potential contributors" showed evidence of solvent or caustic contamination. However, most of these were of quantities less than 5 gallons per month. Indeed, the major problem observed during the survey was oil spillage at the many automotive repair facilities. Several firms had oil soaked areas which resembled asphalt. While oil is not as significant a problem as industrial chemicals or solvents, it could well contribute to the continued degradation of the aquifer.

It must be emphasized that the quantities of oil and solvent being spilled on the ground do not appear to be of sufficient quantities to explain the levels found in well 12-A. These practices would more likely manifest themselves as a slow deterioration of the whole aquifer, not a high level in one well. The high levels found in well 12-A would seem to indicate isolated events, involving rather sizable quantities of the various contaminants found in the water samples. While it is possible that this contamination is from an tive firm, this was not conclusively shown by the survey. Such a possibility cannot be ruled out but neither would it be a safe statement.

One of the other widespread practices which is of concern to the TPCHD involves the use of garbage dumpsters. The dumpster is among the few remaining bastions of the "out of sight, out of mind" attitudes so prevalent in the past. Many firms that are conscious about contaminating the soils or floors of their buildings will throw gallons of spoiled paint, solvents, or dip-type carburator cleaners into their dumpsters. While such a practice does reduce the rate of groundwater contamination in the channel area, it might well accelerate the degradation of the groundwater in the area of the landfill.

ORIGINAL TO: LAB FILES
COPIES TO:
M. McCALL (3)
Will Abercrombie WG
Jim Oberlander

ENVIRONMENTAL LABORATORY
DATA SUMMARY
METALS

PLACE GRIFFEN WHEEL, Peoria County PROGRAM NUMBER 03-1-573

DATE COLLECTED 8-5-82 RECEIVED 8-5-82 COLLECTED BY WILL ABERCROMBIE

Sample (Log) Number / Station:	Units	Standard Deviation ± %		82-3882 / 82-8-1155	Foundry Waste		82-3881 / 82-8-1154	Oil Storage Tank		
Cu	mg/kg	10		14×10^3						
Zn	mg/kg	10		185×10^3						
Ba	mg/kg	10		10.						
Fe	mg/kg	10		40.						
Cr	mg/kg	10		1.						
Cd	mg/kg	10		62.						
Pb	mg/kg	10		183×10^3						
NOTE: ALL RESULTS ABOVE ON MATERIAL SOLUBLE IN 5% v/v - HNO_3										
Hg	mg/kg	±10%		4.						
Flash Pt.	°F	± 2%		—			210.			

NOTE: Dissolved Metals: Those that will pass through a 0.45 μ membrane filter
Suspended Metals: Those retained by a 0.45 μ membrane filter
Total Metals: Those found in the unfiltered, rigorously acid digested sample
mg/L = ppm = μg/ml mg/kg = ppm = μg/gm
μg/L = ppb = ng/ml μg/kg = ppb = ng/gm
" < " is "less than" and " > " is "greater than"

EQ7 0-3-2-82 (a)
Rev. 8/81

1/150 SUMMARIZED BY [signature] DATE 9/2/82
REVIEWED BY [signature] DATE 9/2/1982

LAB FILES

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M McCaw (3)
W.U Abercrombie
Jim Oberlander

REDMOND ENVIRONMENTAL LABORATORY
DATA SUMMARY
METALS

...CE GRIFFEN WHEEL, Pierce County PROGRAM NUMBER 03/ 1 /573

DATE RECEIVED 8-5-82 COLLECTED BY W. ABERCROMBIE

Sample (Log) Number / Station:	Units	Standard Deviation ± %	82-3882 / 82-8-1155	Foundry Waste						
Ag-EPTOX	mg/L	10%	<0.02	ppm						
Ba-EPTOX	mg/L	10	<0.1	ppm						
As-EPTOX	mg/L	10	0.008	ppm						
Se-EPTOX	mg/L	10	0.003	ppm						
Cr EPTOX	mg/L	10	<0.02	ppm						
Cd EPTOX	mg/L	10	0.67	ppm						
Pb EPTOX	mg/L	10	135.	ppm						
Mn										
Hg EPTOX	µg/L	±10%	0.56	ppb						

NOTE: Dissolved Metals: Those that will pass through a 0.45 µ membrane filter
Suspended Metals: Those retained by a 0.45 µ membrane filter
Total Metals: Those found in the unfiltered, rigorously acid digested sample
mg/L= ppm = µg/ml
µg/L= ppb = ng/ml
mg/kg = ppm - µg/gm
µg/kg = ppb = ng/gm
"<" is "less than" and ">" is "greater than"

1/67 SUMMARIZED BY [signature] DATE 9/20/82

REVIEWED BY [signature] DATE 9/30/82

ECY 040-2-32(a)
Rev. 11/80

APPENDIX J

PRELIMINARY SITE INVESTIGATION
SOUTH TACOMA SWAMP - 1983

Prepared for

U.S. ENVIRONMENTAL PROTECTION AGENCY
CINCINNATI, OHIO

PRELIMINARY SITE INVESTIGATION

South Tacoma Swamp
Tacoma, Washington

CONTRACT NUMBER 68-03-1614
WORK ASSIGNMENT Z-3-6

B&V Project No. 9860.C03

June 1983

Black & Veatch
Consulting Engineers

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ACKNOWLEDGEMENTS

Essential information and assistance in support of this remedial investigation was provided to Black & Veatch, Engineers-Architects and Black & Veatch's prime subcontractor, Woodward-Clyde Consultants by the following entities:

U.S. Environmental Protection Agency (EPA), Region 10
EPA Region 10 Laboratory, Manchester, Washington
City of Tacoma, Water Division
City of Tacoma, Sewer Utility Division
City of Tacoma, Department of Public Works
Tacoma-Pierce County Health Department (TPCHD)
State of Washington, Department of Social and Health Services (DSHS)
State of Washington, Department of Ecology (DOE)

Their cooperation during this investigation was appreciated.

AUTHORIZATION

The Preliminary Site Investigation, South Tacoma Swamp was authorized under Work Assignment Z-3-6, EPA Contract 68-03-1614. The work assignment was authorized July 29, 1982.

Property access for performance of field activities was obtained by the U.S. Environmental Protection Agency, Region 10.

INTRODUCTION

This investigation was conducted under the direction of Black & Veatch, Engineers-Architects. Woodward-Clyde Consultants provided geotechnical consultation and field support under a subcontract to Black & Veatch. Laboratory analytical support was provided by the EPA Contract Laboratory Program.

The scope of the preliminary site investigation was to locate and identify contaminants in the ground water, surface water, surface soil, and subsurface soil. The objectives of the investigation were to define the potentiometric surface for the study area to perform a magnetometer survey in areas designated by the EPA Region 10 and to obtain representative samples of the ground water, surface water, surface soil,and subsurface soil. Evaluation and interpretation of data presented herein is to be accomplished by others as directed by the EPA.

FIELD INVESTIGATION

An initial site survey was conducted during the first week of August 1982. The purpose of this visit was to familiarize project personnel with the area, survey the topography and surficial geology and to review historical information so that well and sample locations could be selected. A meeting was held with representatives of the TPCHD and EPA Region 10 on August 4, 1982 to review the historical information obtained under the direction of Mr. Doug Pierce of the TPCHD. The preliminary well and sample locations were discussed during this meeting. Preliminary well and sample locations were selected near previous railroad facilities, suspected drum burial areas, PCB tank draining areas, and along drainage ways which were identified during the historical survey and the site visits. A literature review of available data describing the regional geology and hydrology was conducted in conjunction with the Well 12A Remedial Investigation. The descriptions of the regional geology and hydrogeology are presented herein.

The field activities were initiated during the first week of August, 1982 and were completed during the first week of December, 1982. The field investigation program included initial site reconnaissance, installation of thirteen ground-water monitoring wells, and sampling of surface water, ground water, surface soil, and subsurface soil. Well and sampling locations, shown in Figure 1 and listed in Table 1, were selected to provide coverage of potential source areas identified during a historical survey by the Tacoma-Pierce County Health Department (TPCHD) and to provide data on the geology and hydrogeology of the area. Air quality was monitored during all phases of the field investigation using a Century Model 128 Organic Vapor Analyzer (OVA) in the survey mode. A magnetometer survey was conducted in the fill area north and east of monitoring well CBS-08 and in the areas approximately 120 feet by 120 feet surrounding monitoring wells CBS-01, 02, 03, 06, and 09 using a Geometrics Model G-586 Proton Precision Magnetometer.

Surface-Water Sampling

Surface-water samples were obtained at the locations summarized in Table 1. The surface-water samples were obtained by submersing a half-gallon glass jar in the water and then filling the sample containers. The first bottle of water was used to fill the two 40-ml volatile organics vials. The remaining water from the first jar was poured into a plastic container and used to obtain field measurements of the pH, salinity, conductivity, and temperature. The pH was measured using a Horizon Model 59 pH meter. The pH meter was calibrated using a pH 7 buffer solution prior to and subsequent to each sample measurement. The

TABLE 1

WELL AND SAMPLE LOCATIONS
SOUTH TACOMA SWAMP

Well Number	Locations
CBS-01	Located on Burlington-Northern property approximately 1,250 feet south of center of Adams and 35th Street, in a surface depression.
CBS-02	Located on Burlington-Northern property on a line extended from S. 40th Street approximately 280 feet south and 640 feet west of City Well 4A.
CBS-03	Located on Burlington-Northern property approximately 370 feet south of lines extended from S. 45th Street and Procter Street.
CBS-04	Located on Anderson Enterprises property north and east of the entrance of the Medeira Corporation on Procter Street.
CBS-05	Located on city property on the west side of Procter Street approximately 760 feet north of the center of S. 56th Street.
CBS-06	Located on Burlington-Northern property approximately 790 feet south of the center of S. 48th Street and approximately 440 feet east of S. Manitou Way.
CBS-07	Located on city property on the west side of Adams Street approximately 200 feet north of the center of 47th Street at 4520 Adams.
CBS-08	Located on Burlington-Northern property approximately 400 feet east of lines extended from the intersection of Tyler Street and S. Manitou Way.
CBS-09	Located on Pacific Container Corporation property approximately 470 feet north of the intersection of lines extended from S. 56th Street and S. Manitou Way.
CBS-10	Located on city property between the sidewalk and curb on the west side of Washington Street approximately 270 feet north of the center of S. 56th Street.

TABLE 1

WELL AND SAMPLE LOCATIONS
SOUTH TACOMA SWAMP

Well Number	Locations
CBS-11	Located on city property in the southwest corner of S. 51st and Adams Streets or 207 feet west of the east curb line of Washington and 340 feet south of south curb at S. 50th Street.
CBS-12	Located on city property on the east side of Madison Street on a line extending from the centerline of S. 49th Street.
CBS-13	Located on Burlington-Northern property 17.3 feet north of CBS-06 and approximately 807 feet south of the center of a line extending from the center of S. 48th Street. this is the deep well
Surface Water	
CBS-14	Located on Burlington-Northern property approximately 80 feet north and 80 feet west of the intersection of lines extended from the centerline of S. 42nd and Monroe Streets.
CBS-15	Located on Burlington-Northern property approximately 650 feet south and 350 feet east of the intersection of lines extended from the centerlines of S. 42nd Street and S. Manitou Way.
CBS-16	Located on Burlington-Northern property approximately 920 feet south of the center of a line extended from the center of S. 42nd Street and approximately 360 feet east of the center of S. Manitou Way.
CBS-17	Located on Burlington-Northern property just west of a power pole approximately 590 feet north of the center of a line extended from the center of S. 48th Street and 400 feet east of S. Manitou Way.
CBS-18	Located on Burlington-Northern property approximately 90 feet north of the centerline of S. 48th Street and approximately 290 feet east of S. Manitou Way.
CBS-19	Located on Lige Dickson property in a drainage ditch approximately 210 feet south of a line extended from the centerline of S. 48th Street and 520 feet west of Madison Street.

TABLE 1

WELL AND SAMPLE LOCATIONS
SOUTH TACOMA SWAMP

Surface Water	Locations
CBS-20	Located on Lige Dickson property at the north end of a pond just east of S. 49th Street and S. Manitou Way.
CBS-21	Located on city property at the southeast corner of the same pond as CBS-20.
CBS-22	Located on city property at the south end (upstream) of a culvert under the S. 50th Street right of way approximately 660 feet east of the center of S. Manitou Way.
CBS-23	Located on Burlington-Northern property at a small pond approximately 50 feet north of a projection from the center of S. 52nd Street and approximately 250 feet east of the center of S. Manitou Way.
CBS-24 through CBS-25	Not Used.
Soil Samples	
CBS-26	Located in the City of Tacoma's public utilities storage yard, approximately 870 feet south and 880 feet west of the intersection of S. 35th Street and Union Street.
CBS-27	Located at same location as CBS-26 but at a depth of approximately 1 foot.
CBS-28	Located on Burlington-Northern property west of the D&B Fuel Property at the intersection of Washington Street and S. Tacoma Way. The sample was taken between the west fence line and the railroad tracks.
CBS-29	Located on Burlington-Northern property at the same location as CBS-28 but at a depth of approximately 1 foot.
CBS-30	Located on Burlington-Northern property on the east side of the drainage ditch approximately 60 feet south and 50 feet west of the intersection of lines extending from S. 42nd and Monroe Streets.
CBS-31	Located on Burlington-Northern property at the same location as CBS-30 but at a depth of approximately 1 foot.

TABLE 1

WELL AND SAMPLE LOCATIONS
SOUTH TACOMA SWAMP

Soil Samples	Locations
CBS-32	Located on Burlington-Northern property in an excavation approximately 200 feet north and 210 feet east of the intersection of S. 52nd Street and S. Manitou Way.
CBS-33	Located at the same location as CBS-32 but at a depth of approximately 1 foot.
CBS-34	Located on Anderson Enterprises property approximately 300 feet south of the Old Griffin Wheel Foundry and approximately 130 feet west of a line extended from the centerline of Proctor Street.
CBS-35	Located on Anderson Enterprises property at the same location as CBS-34 but at a depth of approximately 1 foot.
CBS-36	Located on Burlington-Northern property in the landfill/ dump area. The sample location is approximately 110 feet south of the S. 50th Street right of way and approximately 260 feet west of the centerline of Madison Street.
CBS-37	Located at the same location as CBS-36 but at a depth of approximately 1 foot.
CBS-38	Located on Burlington-Northern property approximately 150 feet south and 770 feet east of the intersection of S. Manitou Way and S. 52nd Street.
CBS-39	Located at the same location as CBS-38 but at a depth of approximately 1 foot.
CBS-40	Located on Anderson Enterprises property approximately 840 feet north and approximately 40 feet east of the intersection of S. 56th and Proctor Streets.
CBS-41	Located on Anderson Enterprises property at the same location as CBS-40 but at a depth of approximately 1 foot.
CBS-42 through CBS-46	Not Used.

TABLE 1

WELL AND SAMPLE LOCATIONS
SOUTH TACOMA SWAMP

Soil Samples	Locations
CBS-47	Located on Burlington-Northern property approximately 620 feet south and 140 feet west of the intersection of a line extended from the center of S. 48th Street and Madison Street.
CBS-48	Located at the same location as CBS-47 but at a depth of approximately 1 foot.
CBS-49	Abandoned railroad well located on General Plastics property approximately 91 feet from the northwest corner and 147 feet from the northeast corner of the General Plastics Corporation building.

salinity, conductivity, and temperature were measured using a Yellow Springs Instrument Model 33 SCT meter. The SCT meter was calibrated using a buffer solution prior to each sampling effort. Subsequent bottles of surface water were used to fill bottles for the analysis of extractable priority pollutant organics, ammonia, metals, cyanide, sulfide, chloride, and nitrate. A summary of the field analyses for the surface-water samples is presented in Table 2. After the samples were packaged, they were shipped to the EPA contract laboratories for analysis. Table A-1 of Appendix A lists the EPA contract laboratories which were utilized and analytical detection limits. The results of the surface-water analyses for detected priority pollutant organics, metals, and other inorganics are summarized in Table A-2 of Appendix A.

Monitoring Well Installation and Development

Twelve shallow wells and one deep well were installed at the locations given in Figure 1 and summarized in Table 1. The borings for the twelve shallow wells were advanced using a 4-inch inside diameter, 10-inch outside diameter hollow-stem auger with an 11-inch drill bit. Soil samples were obtained at 5-foot intervals with a Dames & Moore sampler, extruded in the field, logged by a geologist and placed in glass sample containers. The borings were advanced to a depth which was approximately 7 feet below the depth at which the water table was first encountered. After the boring for each monitoring well was advanced to the final depth, a 2-inch PVC casing with 5 feet of slotted (0.010 inch) well screen was placed in the hollow stem. Coarse sand was then placed in the annulus around the well screen to a height approximately 2 feet

TABLE 2
SURFACE-WATER SAMPLE - FIELD MEASUREMENTS
SOUTH TACOMA SWAMP

Sample Location	Color	Turbidity	pH	Salinity*	Conductivity **	Temperature (°C)	Date
CBS-14	clear	clear	6.1	0.1	140.	13.5	10-22-82
CBS-15	"	"	6.2	0.1	80.	14.0	10-22-82
CBS-16	"	"	6.3	0.1	150.	14.0	10-22-82
CBS-17	"	"	6.2	0.1	145.	14.0	10-22-82
CBS-18	slightly yellow	clear	6.7	0.4	217.	12.0	10-25-82
CBS-19	slightly yellow	clear	6.5	0.4	225.	12.0	10-25-82
CBS-20	slightly brown	clear	6.8	0.3	190.	12.8	10-25-82
CBS-21	clear	"	6.2	0.5	800.	16.0	10-25-82
CBS-22	"	"	8.2	1.0	900.	14.0	10-25-82
CBS-23	"	"	6.8	0.9	800.	15.0	10-25-82

* parts per thousand
** micromhos per centimeter

above the top of the well screen as the auger was withdrawn. A 2- to 4-foot-thick bentonite slurry seal was then placed by the tremmie method above the filter pack. The remaining annulus from the top of the bentonite seal to the ground surface was filled with a cement/bentonite grout and a 4-inch diameter protective steel casing with locking cap was installed.

The deep well, CBS-13, was installed using an air-rotary drilling rig. Soil samples were obtained at 10-foot intervals using a Dames & Moore sampler, extruded, logged by a geologist, and placed in glass sample containers. A 6-inch-diameter steel casing was driven behind the drill bit in 10-foot intervals to the desired depth. A 4-inch-diameter PVC casing with 20 feet of slotted (0.010 inch) well screen was placed in the hole and a filter pack of coarse sand was placed in the annulus around the well screen as the steel casing was removed. The filter pack was placed to a height at least 2 feet above the top of the well screen. A bentonite slurry seal, 10 feet thick, was then placed above the filter pack. The remaining annulus from the top of the bentonite seal to the ground surface was filled with a cement/bentonite grout. The steel casing was withdrawn to approximately 10 feet above the top of the water table and cut off approximately 6 inches above the top of the PVC well riser. A locking cap was installed on the well. The boring logs for the well borings are presented in Appendix B. The well installation reports are presented in Appendix C.

The twelve shallow wells were developed using bailers which were dedicated to each well. The water column was agitated by moving the bailer up and down in the hole. Approximately five well volumes of water were then removed from each well using the bailer to remove suspended particulate matter. The deep well was developed using a submersible pump. The turbulent flow created by the pump was sufficient to put the fines in suspension for removal. Approximately five well volumes of water were removed during development of the deep well. The depths of the borings for the thirteen monitoring wells are summarized in Table 3. Water surface elevations were measured prior to obtaining each ground-water sample. Additional water surface elevation data was collected on October 14, 1982 and November 24, 1982. The potentiometric head map developed from the water surface elevations measured on October 14, 1982 and November 24, 1982 are presented in Figures 1, 2 and 3, respectively.

It is likely that precipitation, the pumping of the utility wells at the City of Tacoma Department of Public Utilities building, and the cessation of pumping at City Well 9A influenced the potentiometric surface at the north end of the study area. Recovery of the aquifer is apparent between the potentiometric head contours of October 14 and November 24, 1982 where the water levels increased by about 1 foot over the entire study area.

Water level measurements were also obtained at the monitoring wells near City Well 12A on November 24, 1982. The potentiometric surface on November 24, 1982, in the vicinity of well 12A is very flat and slightly higher than the potentiometric surface in the South Tacoma Swamp as shown in Figure 8 of the Well 12A Remedial Investigation Report and Figure 3 of this report. Due to the flat potentiometric surface in the vicinity

PIEZOMETER INSTALLATION REPORT

Project COMMENCEMENT BAY
Project No. K81-4521 Installed By M. Doolan
Piezometer No. CBS-13
Location Tacoma, Wa.
Date 11-8-82 Time 1500

Method of Installation See Boring Log CBS-13 for details.

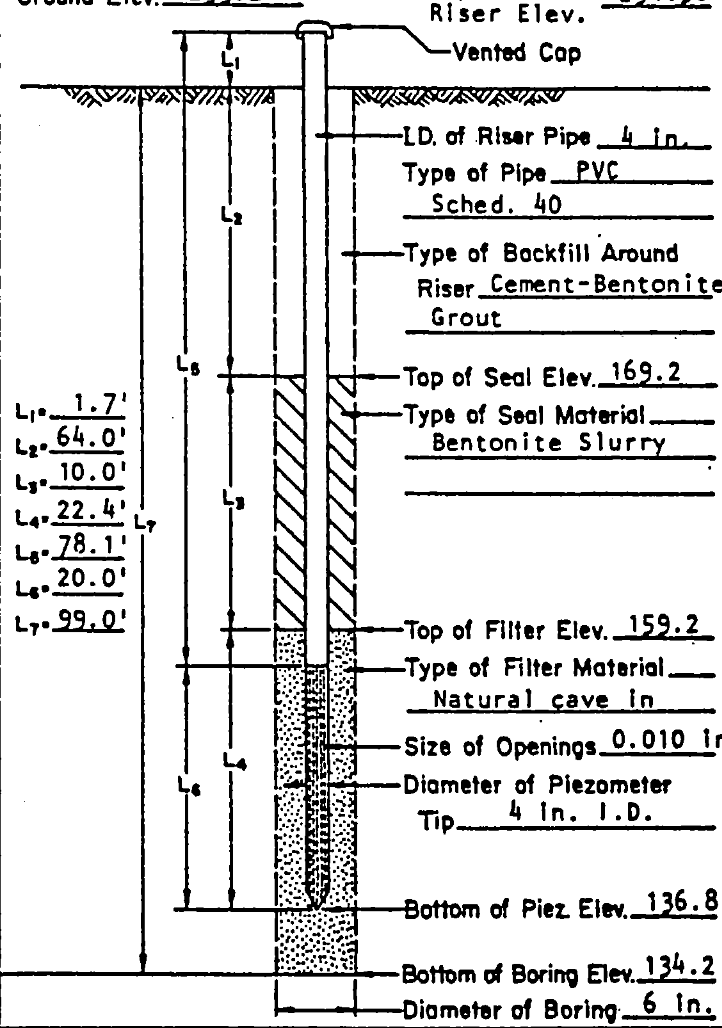
LOG OF BORING AND PIEZOMETER

BORING

Depth in ft.	Description	Symbol
	See Boring Log CBS-13 for detailed description	

PIEZOMETER

Type of Piezometer Monitoring Well



Remarks Protective casing stick-up 1.65'.

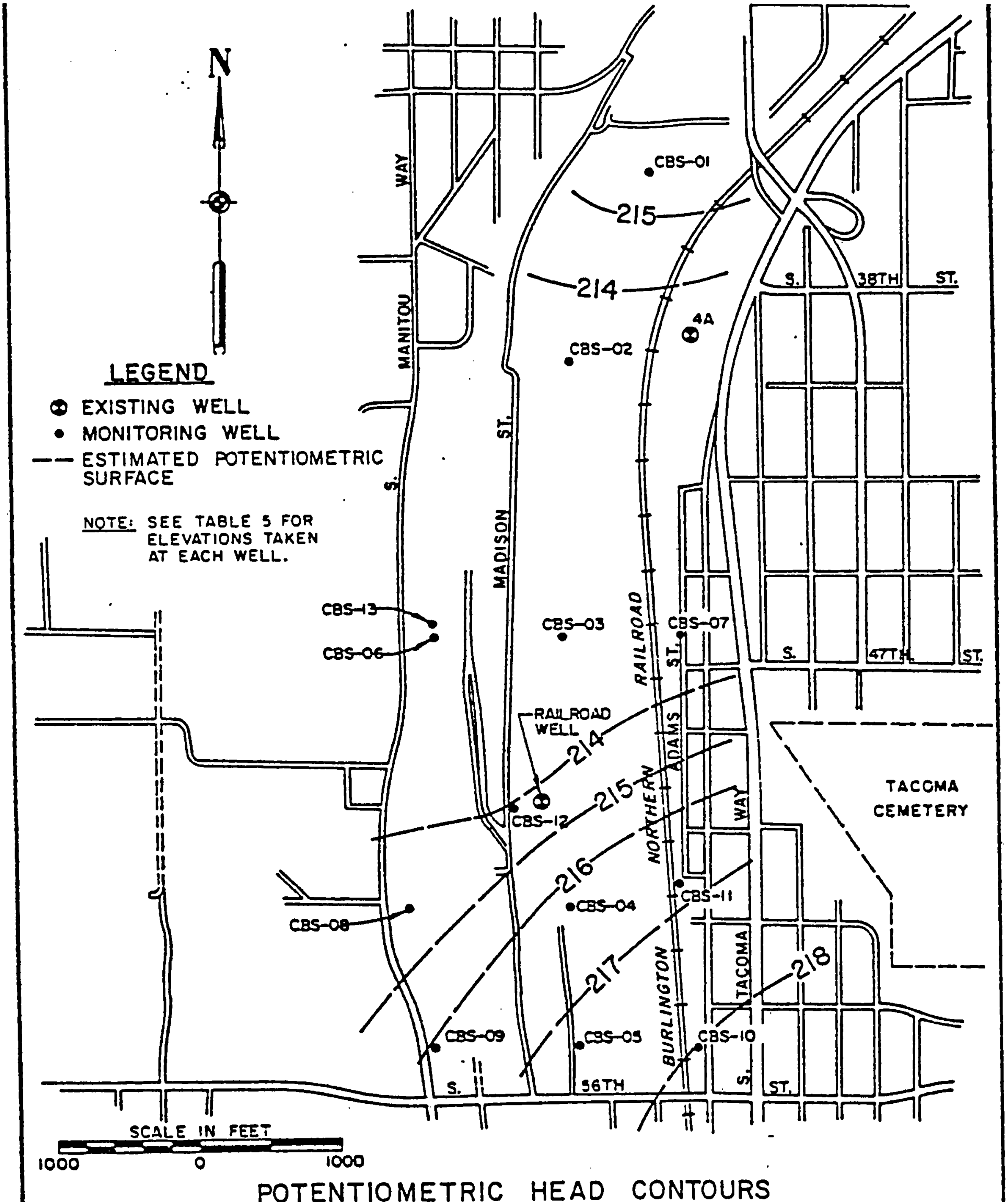
C-13 Inspected By M. Doolan

WOODWARD-CLYDE CONSULTANTS

TABLE 3

SUMMARY OF POTENTIOMETRIC HEAD DATA
SOUTH TACOMA SWAMP

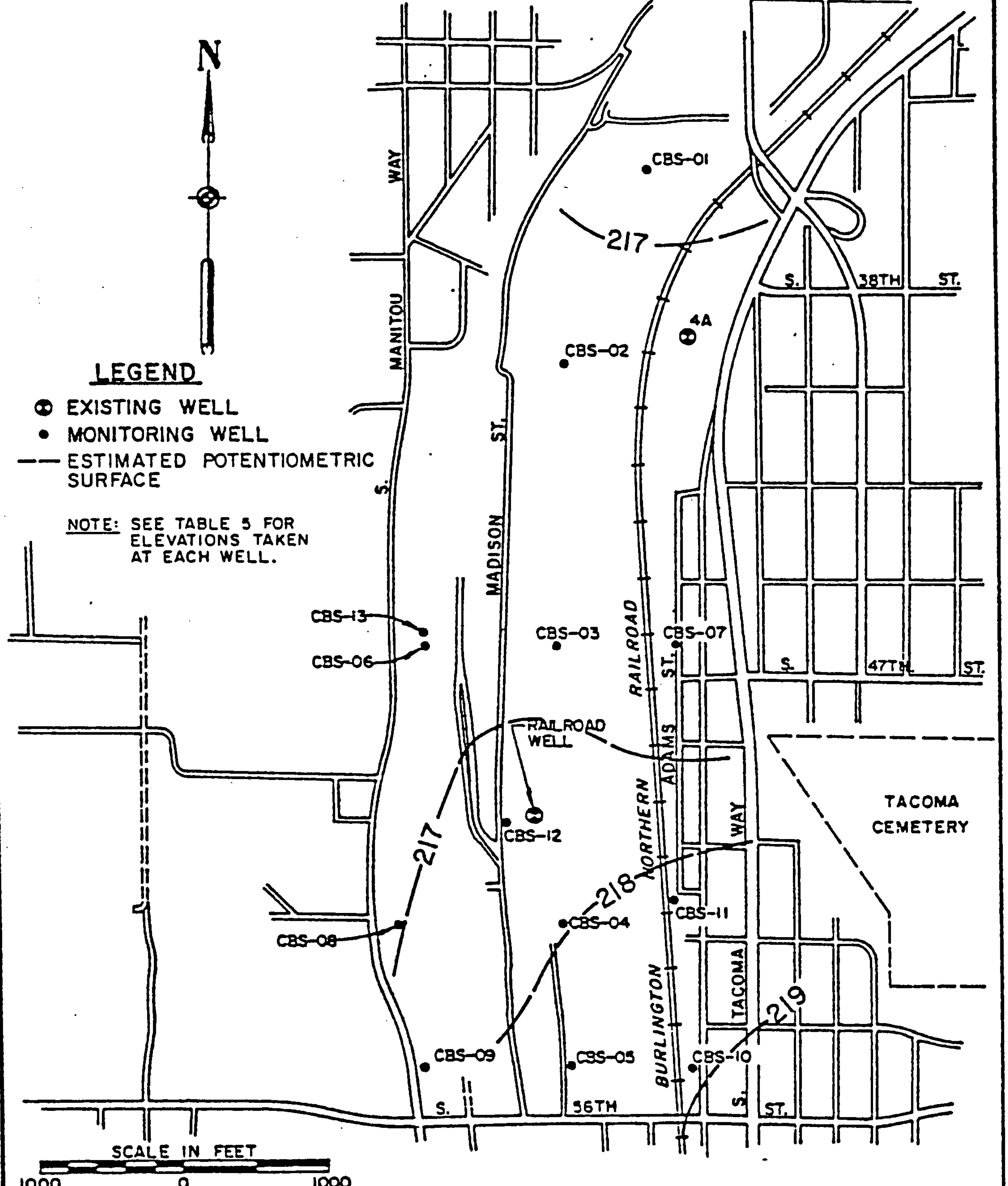
Well No.	Screened Interval (Depth, ft)	Boring Depth (ft)	Elevation At Top of Steel Riser (USGS, ft)	Water Surface Elevation (USGS, ft.)	
				10/14/82	11/24/82
CBS-01	20-30	30.0	240.81	215.6	217.1
CBS-02	28-33	33.0	241.78	213.1	216.8
CBS-03	39-44	44.0	251.14	213.6	216.8
CBS-04	38-43	43.5	252.30	216.3	218.0
CBS-05	23-28	29.0	239.28	217.4	218.5
CBS-06	23-28	28.0	234.37	213.3	216.6
CBS-07	43-48	48.0	255.40	213.1	216.1
CBS-08	13-18	18.0	226.44	214.3	217.0
CBS-09	29-34	34.0	243.88	216.1	215.9
CBS-10	39-44	44.0	256.45	218.0	218.9
CBS-11	39-44	44.2	254.68	216.8	218.1
CBS-12	28-33	33.0	240.79	214.0	217.3
CBS-13	76-96	99.0	234.90	-	216.5



POTENTIOMETRIC HEAD CONTOURS
FROM WATER LEVEL MEASUREMENTS
TAKEN ON OCTOBER 14, 1982

PRELIMINARY FIELD INVESTIGATION
SOUTH TACOMA SWAMP
TACOMA, WASHINGTON

FIGURE 2



POTENTIOMETRIC HEAD CONTOURS
FROM WATER LEVEL MEASUREMENTS
TAKEN ON NOVEMBER 24, 1982

PRELIMINARY FIELD INVESTIGATION
SOUTH TACOMA SWAMP
TACOMA, WASHINGTON

FIGURE 3

of City Well 12A and the unknown influence of the utility wells and City Well 9A between the two areas, the data from the two investigations were not combined into a single potentiometric surface map.

Ground-Water Sampling

The wells were flushed prior to being sampled. Approximately three to five well volumes of water were bailed. Ground-water samples were obtained approximately 24 hours after flushing using the dedicated bailer. All of the wells were sampled in the screened interval. Samples were obtained using boilers and prepared for analyses using the same procedures as for the surface-water samples.

Two sets of ground-water samples were obtained from the thirteen monitoring wells. The first set of ground-water samples was obtained beginning on October 18. The second set of ground-water samples was obtained approximately two weeks subsequent to the first set.

Two private wells, the Railroad Well and the Soccer Well were identified during an historical survey by the Tacoma-Pierce County Health Department and included in the South Tacoma Swamp Site Sampling Plan. The Railroad Well is a large diameter abandoned production well. One ground-water sample was obtained from the Railroad Well. The field crew attempted to sample the referenced Soccer Well but found that it was only a sump, thus, no sample was taken.

The summary of the parameters measured for ground-water samples during the field analysis is presented in Table 4. The detected priority pollutant organics, metals and other inorganics are summarized in Table A-3 of Appendix A.

TABLE 4
GROUND-WATER SAMPLE - FIELD MEASUREMENTS
SOUTH TACOMA SWAMP

Sample Location	Color	Turbidity	pH	Salinity*	Conductivity **	Temperature (°C)	Date
CBS-01	clear	very turbid	6.3	0.2	190.	11.0	10-20-82
CBS-01	brown	very turbid	6.2	0.3	195.	11.0	11-10-82
CBS-02	clear	slightly	6.3	0.2	195.	10.0	10-20-82
CBS-02	clear	slightly	6.3	0.3	168.	10.0	11-10-82
CBS-03	clear	slightly	6.6	0.2	150.	10.2	10-20-82
CBS-03	clear	clear	6.3	0.3	167.	10.0	11-10-82
CBS-04	brown	turbid	7.7	0.5	310.	11.0	10-20-82
CBS-04	clear	slightly	6.8	0.5	272.	11.0	11-11-82
CBS-05	clear	-	8.2	0.2	140.	12.8	10-19-82
CBS-05	light brown	turbid	6.3	0.2	87.	12.8	11-4-82
CBS-06	gray/brown	turbid	6.6	1.0	1100.	10.2	10-21-82
CBS-06	clear	slightly	6.4	1.0	1110.	9.5	11-11-82
CBS-07	brown	slightly	9.4	0.5	220.	12.5	10-19-82
CBS-07	light brown	turbid	7.4	0.4	210.	12.2	11-4-82
CBS-08	dark gray	very silty	6.6	1.0	1100.	11.8	10-21-82
CBS-08	dark gray	-	6.4	1.0	1090.	11.0	11-11-82
CBS-09	gray	slightly	6.1	0.3	290.	11.5	10-21-82
CBS-09	clear	slightly	6.0	0.5	292.	10.0	11-11-82
CBS-10	clear	-	7.8	0.5	270.	12.0	10-19-82
CBS-10	clear	-	-	-	-	-	-
CBS-11	clear	-	6.6	0.5	330.	11.8	10-19-82
CBS-11	light brown	slightly	6.5	0.4	319.	11.8	11-4-82
CBS-12	brown	slightly	6.3	0.3	165.	13.0	10-21-82
CBS-12	clear	slightly	6.4	0.3	125.	11.8	11-10-82
CBS-13	clear	-	7.1	0.6	457.	11.2	11-4-82
CBS-13	gray	slightly	11.2	1.0	1120.	10.3	11-16-82
CBS-13	clear	slightly	10.7	0.3	431.	12.1	11-30-82

* parts per thousand
** micromhos per centimeter

Soil Sampling

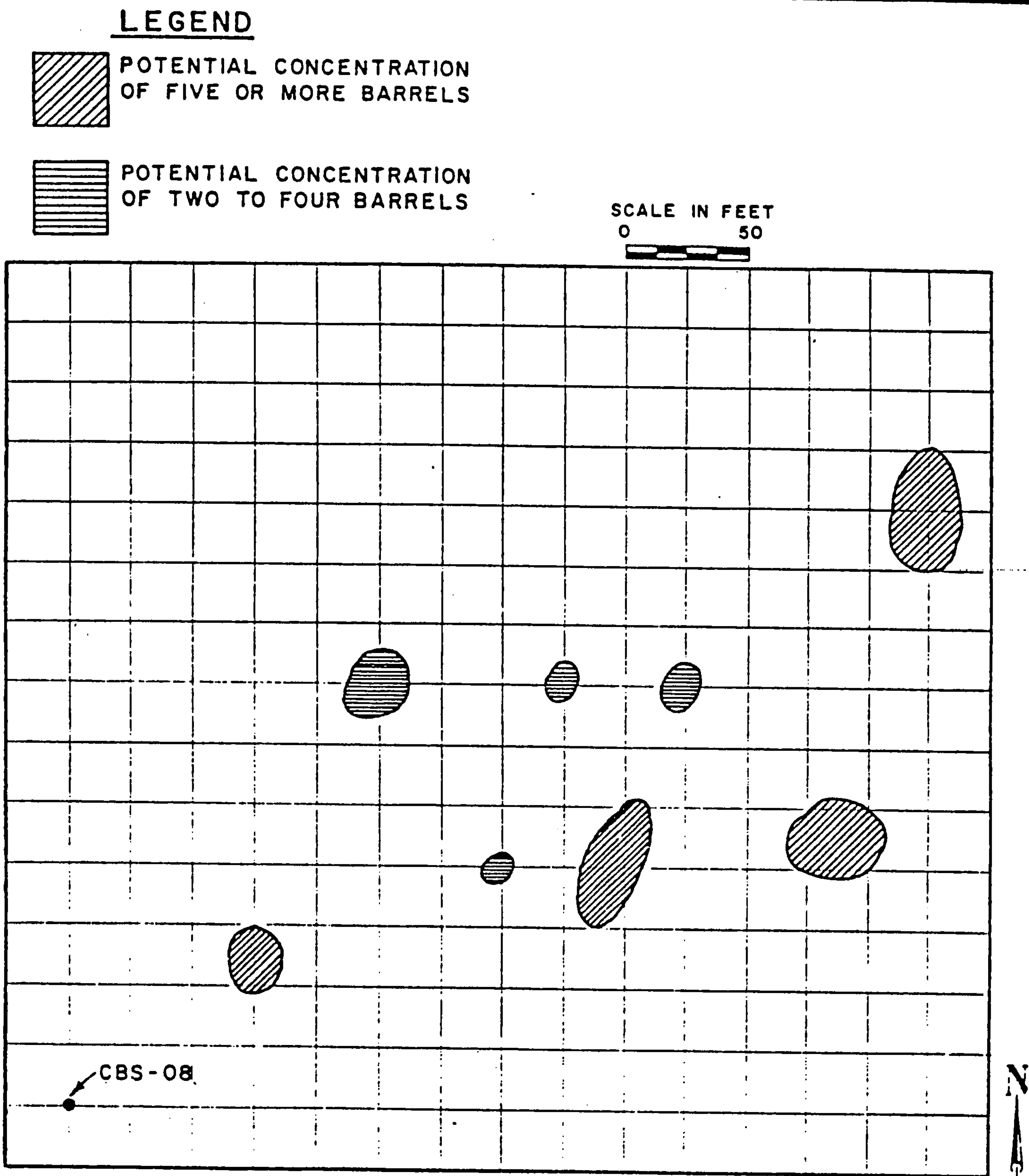
Surface soil samples were obtained from the nine locations outlined in Table 1 and shown on Figure 1. Two samples were obtained from each location (one sample at the surface and the second sample at a depth of 1 foot). The samples were taken using a shovel and were placed in 16-ounce glass jars. The shovel was decontaminated between each sample using the procedure outlined in the sampling plan. Samples were then packaged and shipped to the EPA contract laboratories for analysis. The detected priority pollutant organics, metals and inorganics analyses are presented in Table A-4 of Appendix A.

Subsurface soil samples were obtained from each well boring as previously described. The samples were extruded and placed in 16-ounce glass jars. Approximately 15 minutes after placement in the jars, the tops were removed and an OVA reading was taken in the head space above the jars. The two samples with the highest OVA readings were sent to the EPA contract laboratories for analysis. The summary of the detected priority pollutant organics, metals, and inorganics for the subsurface soil samples is presented in Table A-5 of Appendix A.

Magnetometer Survey

A magnetometer survey was performed in the vicinity of well locations CBS-08, 01, 02, 03, 06, and 09 using a Geometrics Instruments Model G-856 Proton Precession Magnetometer.

The magnetometer was used to determine the location of buried metallic objects in the fill area near well location CBS-08 and to determine if buried metals were present at the sites of borings CBS-01, 02, 03, 06, and 09. The area in the vicinity of well location CBS-08 has been backfilled with construction debris and industrial by-products. There are several unopened 55-gallon metal drums which lie on the surface of the fill and appear to be full. The drums are badly rusted and are deteriorating. Several of the drums have "Used Solvents" written on their sides. The magnetometer survey near CBW-08 was conducted over an area 375 by 425 feet, as shown in Figure 4. Seven areas were identified where there is a high probability of the presence of buried metals, three of which had readings that would be indicative of the presence of large quantities of buried metals. If the buried metal at these locations was in the form of 55-gallon drums, the readings indicate a potential concentration of five or more drums at these locations. Similarly, the readings at the remaining four locations indicate the presence of potential concentrations of two to four drums. No buried metals were detected at locations CBS-03, 06, and 02. Buried metals were detected in the vicinity of well locations CBS-01 and 02 but were far enough away that they did not present a hazard to drilling. The locations of the buried metals for well locations CBS-01 and 02 are presented in Figures 5 and 6, respectively.



RESULT OF THE MAGNETOMETER

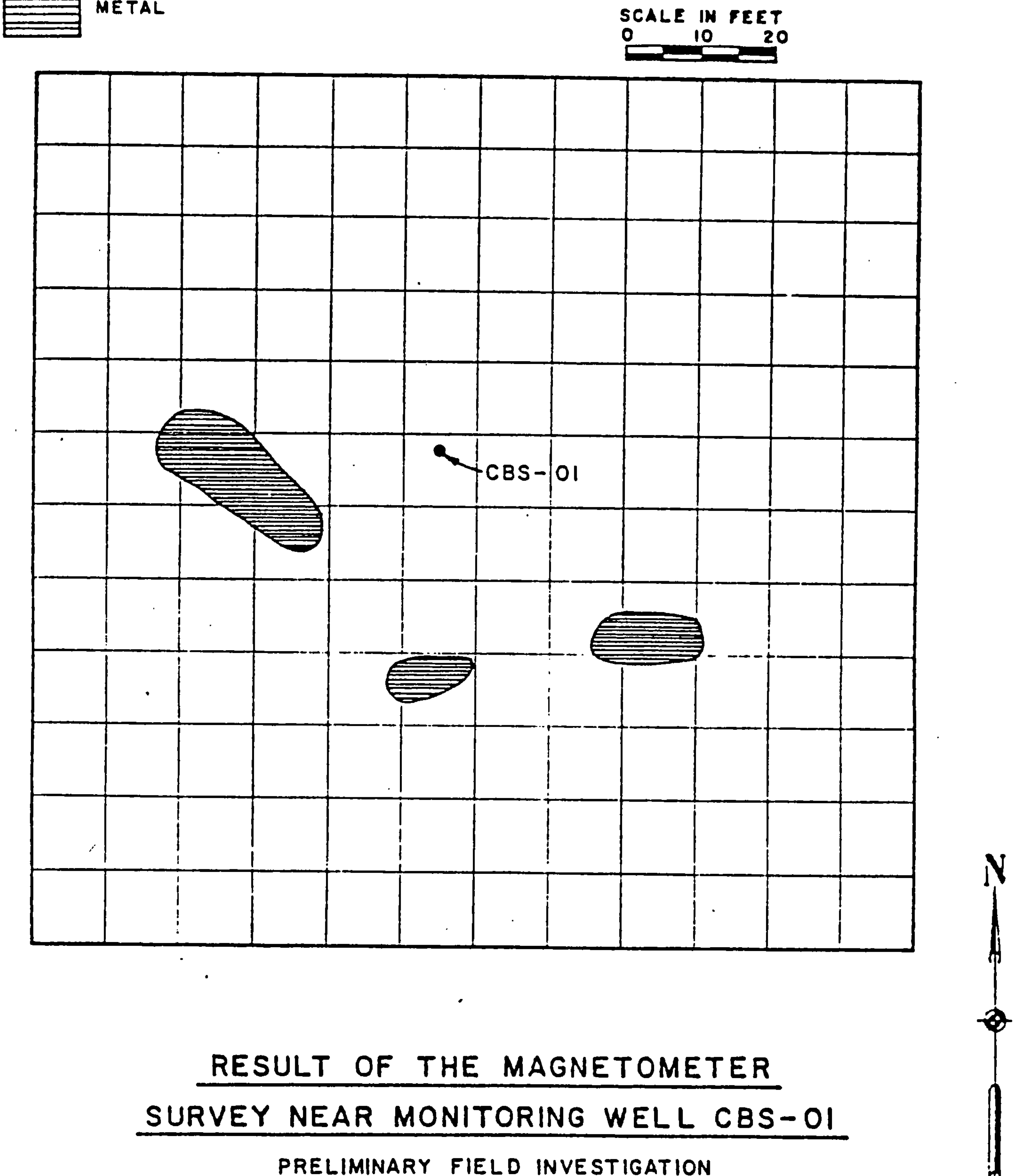
SURVEY NEAR MONITORING WELL CBS-08

PRELIMINARY FIELD INVESTIGATION
SOUTH TACOMA SWAMP
TACOMA, WASHINGTON

FIGURE 4

LEGEND

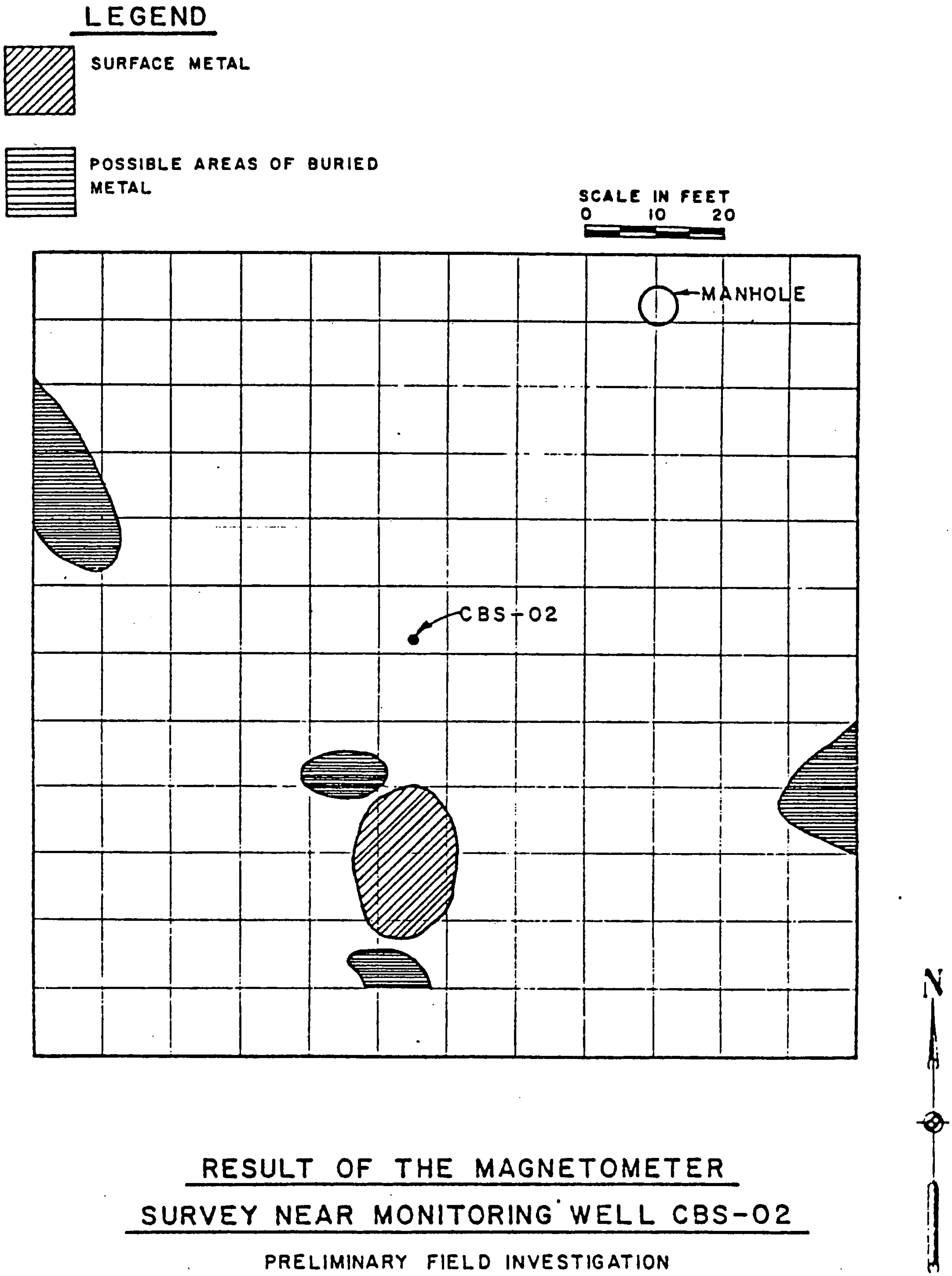
POSSIBLE AREAS OF BURIED METAL



RESULT OF THE MAGNETOMETER SURVEY NEAR MONITORING WELL CBS-01

PRELIMINARY FIELD INVESTIGATION
SOUTH TACOMA SWAMP
TACOMA, WASHINGTON

FIGURE 5



RESULT OF THE MAGNETOMETER SURVEY NEAR MONITORING WELL CBS-02

PRELIMINARY FIELD INVESTIGATION
SOUTH TACOMA SWAMP
TACOMA, WASHINGTON

FIGURE 6

APPENDIX A

SAMPLE ANALYSES

SOUTH TACOMA SWAMP

PRELIMINARY SITE INVESTIGATION

DETECTION LIMIT SUMMARY
AND SAMPLE ANALYSES NOMENCLATURE

1) SMO: EPA Sample Management Office, Region 10

2) B&V: BLACK & VEATCH Engineers-Architects

3) CBS: Commencement Bay South Tacoma Swamp

4) B&V Sample No.: Sample number designation in accordance with the B&V sampling manual. The sample designation consists of the station designation, a two-letter sample media code, and a two-digit sequence number. Sample media codes applicable to South Tacoma Swamp (CBS) sampling efforts are:

GW	Ground water
SW	Surface water
SL	Surface soil
SS	Subsurface soil

Example sample designations are:

CBS-03-SS-02	Second subsurface soil sample at station CBS-03
CBS-07-GW-01	First ground-water sample at station CBS-07

5) DETECTION LIMIT REFERENCE NUMBER: Parenthesized numbers on sample analyses Tables A-2 through A-6 which serve as a cross-reference with the Detection Limit Summary (Table A-1). Table A-1 lists the EPA contract laboratories which performed the analyses and their respective detection limits.

6) Units definition:

ug/l = micrograms per liter
mg/l = miligrams per liter
ug/Kg = micrograms per Kilogram
mg/Kg = miligrams per Kilogram
ug/g = micrograms per gram
ppm = parts per million
ppb = parts per billion

U.S. ENVIRONMENTAL PROTECTION AGENCY
EPA CONTRACT NO. 68-03-1614
WORK ASSIGNMENT NO. Z-3-6

TABLE A-1

SOUTH TACOMA SWAMP
PRELIMINARY SITE INVESTIGATION
DETECTION LIMIT SUMMARY - ORGANICS

LABORATORY NAME	MEAD	MEAD	MEAD	WCTS	WCTS	WCTS
CONCENTRATION DESCRIPTION	LL	ML	ML	LL	LL	LL
SAMPLE TYPE	Solid	Solid	Solid	Water	Water	Water
DETECTION LIMIT REFERENCE NO.	(1) (ug/kg or ppb)	(2) (ug/g or ppm)	(3) (ug/g or ppm)	(4) (ug/l)	(5) (ug/l)	(6) (mg/l)
Acid Compounds						
2,4,6-trichlorophenol	400	10	10	2	4	10
p-chloro-m-cresol	400	20	20	2	4	10
2-chlorophenol	400	10	10	2	4	10
2,4-dichlorophenol	400	10	10	2	4	10
2,4-dimethylphenol	400	10	10	2	4	10
2-nitrophenol	800	20	20	2	4	10
4-nitrophenol	4000	100	100	2	4	10
2,4-dinitrophenol	2000	50	50	2	4	10
4,6-dinitro-o-cresol	800	20	20	2	4	10
pentachlorophenol	800	20	20	2	4	10
phenol	400	10	10	2	4	10
(Non-Priority Pollutants)						
benzoic acid	4000	100	100	2	4	10
2-methylphenol	400	10	10	2	4	10
4-methylphenol	400	10	10	2	4	10
2,4,5-trichlorophenol	4000	100	100	2	4	10
Base/Neutral Compounds						
acenaphthene	400	10	10	2	4	10
benzidine	1600	40	40	2	4	10
1,2,4-trichlorobenzene	400	10	10	2	4	10
hexachlorobenzene	400	10	10	2	4	10
hexachloroethane	400	10	10	2	4	10
bis (2-chloroethyl)ether	400	10	10	2	4	10
2-chloronaphthalene	400	10	10	2	4	10
1,2-dichlorobenzene	400	10	10	2	4	10

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U.S. ENVIRONMENTAL PROTECTION AGENCY
EPA CONTRACT NO. 68-03-1614
WORK ASSIGNMENT NO. Z-3-6

TABLE A-1

BLACK & VEATCH
KANSAS CITY, MO

SOUTH TACOMA SWAMP
PRELIMINARY SITE INVESTIGATION
DETECTION LIMIT SUMMARY - ORGANICS
(Continued)

LABORATORY NAME	MEAD	MEAD	MEAD	WCTS	WCTS	WCTS
CONCENTRATION DESCRIPTION	LL	ML	ML	LL	LL	LL
SAMPLE TYPE	Solid	Solid	Solid	Water	Water	Water
DETECTION LIMIT REFERENCE NO.	(1)	(2)	(3)	(4)	(5)	(6)
Base/Neutral Compounds	(ug/kg or ppb)	(ug/g or ppm)	(ug/g or ppm)	(ug/l)	(ug/l)	(mg/l)
1,3-dichlorobenzene	400	10	10	2	4	10
1,4-dichlorobenzene	400	10	10	2	4	10
3,3-dichlorobenzidine	800	20	20	2	4	10
2,4-dinitrotoluene	800	20	20	2	4	10
2,6-dinitrotoluene	800	20	20	2	4	10
1,2-diphenylhydrazine (as azobenzene)	800	20	20	2	4	10
fluoranthene	400	10	10	2	4	10
4-chlorophenyl phenyl ether	400	10	10	2	4	10
4-bromophenyl phenyl ether	400	10	10	2	4	10
bis (2-chloroisopropyl) ether	800	20	20	2	4	10
bis (2-chloroethoxy) methane	800	20	20	2	4	10
hexachlorobutadiene	400	10	10	2	4	10
hexachlorocyclopentadiene	400	10	10	2	4	10
isophorone	400	10	10	2	4	10
naphthalene	400	10	10	2	4	10
nitrobenzene	400	10	10	2	4	10
N-nitrosodimethylamine	400	10	10	2	4	10
N-nitrosodiphenylamine	400	10	10	2	4	10
N-nitrosodi-n-propylamine	800	20	20	2	4	10
bis (2-ethylhexyl) phthalate	400	10	10	2	4	10
butyl benzyl phthalate	400	10	10	2	4	10
di-n-butyl phthalate	400	10	10	2	4	10
di-n-octyl phthalate	400	10	10	2	4	10
diethyl phthalate	400	10	10	2	4	10
dimethyl phthalate	400	10	10	2	4	10
benzo(a)anthracene	400	10	10	2	4	10
benzo(a)pyrene	800	20	20	2	4	10

Footnotes on page 6 of 8

TABLE A-1

SOUTH TACOMA SWAMP
PRELIMINARY SITE INVESTIGATION
DETECTION LIMIT SUMMARY - ORGANICS
(Continued)

LABORATORY NAME	MEAD	MEAD	MEAD	WCTS	WCTS	WCTS
CONCENTRATION DESCRIPTION	LL	ML	ML	LL	LL	LL
SAMPLE TYPE	Solid	Solid	Solid	Water	Water	Water
DETECTION LIMIT REFERENCE NO.	(1)	(2)	(3)	(4)	(5)	(6)
Base/Neutral Compounds	(ug/kg or ppb)	(ug/g or ppm)	(ug/g or ppm)	(ug/l)	(ug/l)	(mg/l)
3,4-benzo fluoranthene	800	20	20	2	4	10
benzo(k)fluoranthene	800	20	20	2	4	10
chrysene	400	10	10	2	4	10
acenaphthylene	400	10	10	2	4	10
anthracene	400	10	10	2	4	10
benzo(ghi)perylene	800	20	20	2	4	10
fluorene	400	10	10	2	4	10
phenanthrene	400	10	10	2	4	10
dibenzo(a,h)anthracene	800	20	20	2	4	10
indeno(1,2,3-cd)pyrene	800	20	20	2	4	10
pyrene	400	10	10	2	4	10
2,3,7,8-tetrachlorodibenzo-p-dioxin	0.08	0.08	0.002	0.007	0.010	.000007
(Non-Priority Pollutants)						
aniline	400	10	10	2	4	10
benzyl alcohol	800	20	20	2	4	10
4-chloraniline	2000	50	50	2	4	10
dibenzofuran	400	10	10	2	4	10
2-methylnaphthalene	800	20	20	2	4	10
2-nitroaniline	4000	100	100	2	4	10
3-nitroaniline	4000	100	100	2	4	10
4-nitroaniline	4000	100	100	2	4	10

Footnotes on page 6 of 8

TABLE A-1

SOUTH TACOMA SWAMP
PRELIMINARY SITE INVESTIGATION
DETECTION LIMIT SUMMARY - ORGANICS
(Continued)

LABORATORY NAME	MEAD	MEAD	MEAD	WCTS	WCTS	WCTS
CONCENTRATION DESCRIPTION	LL	ML	ML	LL	LL	LL
SAMPLE TYPE	Solid	Solid	Solid	Water	Water	Water
DETECTION LIMIT REFERENCE NO.	(1) (ug/kg or ppb)	(2) (ug/kg or ppb)	(3) (ug/kg or ppb)	(4) (ug/l)	(5) (ug/l)	(6) (ug/l)
<u>Volatiles</u>						
acrolein	50	50	50	1	10	1
acrylonitrile	50	50	50	1	10	1
benzene	2.5	2.5	2.5	1	10	1
carbon tetrachloride	2.5	2.5	2.5	1	10	1
chlorobenzene	2.5	2.5	2.5	1	10	1
1,2-dichloroethane	2.5	2.5	2.5	1	10	1
1,1,1-trichloroethane	2.5	2.5	2.5	1	10	1
1,1-dichloroethane	2.5	2.5	2.5	1	10	1
1,1,2-trichloroethane	2.5	2.5	2.5	1	10	1
1,1,2,2-tetrachloroethane	2.5	2.5	2.5	1	10	1
chloroethane	2.5	2.5	2.5	1	10	1
bis(chloromethyl)ether	na	na	na	1	10	1
2-chloroethylvinyl ether	2.5	2.5	2.5	1	10	1
chloroform	2.5	2.5	2.5	1	10	1
1,1-dichloroethylene	2.5	2.5	2.5	1	10	1
1,2-trans-dichloroethylene	2.5	2.5	2.5	1	10	1
1,2-dichloropropane	na	na	na	1	10	1
1,3-dichloropropylene	2.5	2.5	2.5	1	10	1
ethylbenzene	2.5	2.5	2.5	1	10	1
methylene chloride	2.5	2.5	2.5	1	10	1
methyl chloride	2.5	2.5	2.5	1	10	1
methyl bromide	2.5	2.5	2.5	1	10	1
bromoform	2.5	2.5	2.5	1	10	1
dichlorobromomethane	2.5	2.5	2.5	1	10	1
trichlorofluoromethane	2.5	2.5	2.5	1	10	1
dichlorodifluoromethane	na	na	na	1	10	1
chlorodibromomethane	2.5	2.5	2.5	1	10	1
tetrachloroethylene	2.5	2.5	2.5	1	10	1

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TABLE A-1

SOUTH TACOMA SWAMP
PRELIMINARY SITE INVESTIGATION
DETECTION LIMIT SUMMARY - ORGANICS
(Continued)

LABORATORY NAME	MEAD	MEAD	MEAD	WCTS	WCTS	WCTS
CONCENTRATION DESCRIPTION	LL	ML	ML	LL	LL	LL
SAMPLE TYPE	Solid	Solid	Solid	Water	Water	Water
DETECTION LIMIT REFERENCE NO.	(1) (ug/kg or ppb)	(2) (ug/kg or ppb)	(3) (ug/kg or ppb)	(4) (ug/l)	(5) (ug/l)	(6) (ug/l)
Volatiles						
toluene	2.5	2.5	2.5	1	10	1
trichloroethylene	2.5	2.5	2.5	1	10	1
vinyl chloride	2.5	2.5	2.5	1	10	1
(Non-Priority Pollutants)						
acetone	50	50	50	1	1	1
2-butanone	100	100	100	1	1	1
carbondisulfide	5	5	5	1	1	1
2-hexanone	50	50	50	1	1	1
4-methyl-2-pentanone	50	50	50	1	1	1
styrene	2.5	2.5	2.5	1	1	1
vinyl acetate	5	5	5	1	1	1
o-xylene	2.5	2.5	2.5	1	1	1
Pesticides			(ug/g or ppm)			
aldrin	4.0	4.0	0.01	0.1	0.1	0.1
dieldrin	4.0	4.0	0.01	0.1	0.1	0.1
chlordane	4.0	4.0	0.01	0.1	0.1	0.1
4,4'-DDT	4.0	4.0	0.01	0.1	0.1	0.1
4,4'-DDE	4.0	4.0	0.01	0.1	0.1	0.1
4,4'-DDD	4.0	4.0	0.01	0.1	0.1	0.1
alpha-endosulfan	4.0	4.0	0.01	0.1	0.1	0.1
beta-endosulfan	4.0	4.0	0.01	0.1	0.1	0.1
endosulfan sulfate	4.0	4.0	0.01	0.1	0.1	0.1
endrin	4.0	4.0	0.01	0.1	0.1	0.1
endrin aldehyde	4.0	4.0	0.01	0.1	0.1	0.1
heptachlor	4.0	4.0	0.01	0.1	0.1	0.1

Footnotes on page 6 of 8

TABLE A-1

SOUTH TACOMA SWAMP
PRELIMINARY SITE INVESTIGATION
DETECTION LIMIT SUMMARY - ORGANICS
(Continued)

LABORATORY NAME	MEAD	MEAD	MEAD	WCTS	WCTS	WCTS
CONCENTRATION DESCRIPTION	LL	ML	ML	LL	LL	LL
SAMPLE TYPE	Solid	Solid	Solid	Water	Water	Water
DETECTION LIMIT REFERENCE NO.	(1)	(2)	(3)	(4)	(5)	(6)
Pesticides	(ug/kg or ppb)	(ug/kg or ppm)	(ug/g or ppm)	(ug/l)	(ug/l)	(ug/l)
heptachlor epoxide	4.0	4.0	0.01	0.1	0.1	0.1
alpha-BHC	4.0	4.0	0.01	0.1	0.1	0.1
beta-BHC	4.0	4.0	0.01	0.1	0.1	0.1
gamma-BHC	4.0	4.0	0.01	0.1	0.1	0.1
delta-BHC	4.0	4.0	0.01	0.1	0.1	0.1
PCB-1242	4.0	4.0	0.01	0.1	0.1	0.1
PCB-1254	4.0	4.0	0.01	0.1	0.1	0.1
PCB-1221	4.0	4.0	0.01	0.1	0.1	0.1
PCB-1232	4.0	4.0	0.01	0.1	0.1	0.1
PCB-1248	4.0	4.0	0.01	0.1	0.1	0.1
PCB-1260	4.0	4.0	0.01	0.1	0.1	0.1
PCB-1016	4.0	4.0	0.01	0.1	0.1	0.1
toxaphene	4.0	4.0	0.01	0.1	0.1	0.1

LL-Low level (expected concentrations up to 10 ppm)
ML-Medium level (expected concentrations up to 150,000 ppm)
na-Not analyzed by specific laboratory
MEAD-Mead CompuChem
WCTS-West Coast Technical Service, Inc.

TABLE A-1

SOUTH TACOMA SWAMP
PRELIMINARY SITE INVESTIGATION
DETECTION LIMIT SUMMARY - INORGANICS AND OTHER POLLUTANTS

LABORATORY NAME	CAL	RMA
LEVEL OF ANALYSES	LL	LL
SAMPLE TYPE	Water	Soil
DETECTION LIMIT REFERENCE NO.	(11)	(12)
	(ug/l)	(mg/kg or ppm)
Inorganics		
Silver (Ag)	10	1
Aluminum (Al)	200	20
Boron (B)	100	10
Barium (Ba)	100	10
Beryllium (Be)	5	0.5
Chromium (Cr)	10	1
Cobalt (Co)	50	5
Copper (Cu)	50	5
Iron (Fe)	50	5
Manganese (Mn)	15	1
Nickel (Ni)	40	4
Vanadium (V)	200	20
Zinc (Zn)	10	1
Arsenic (As)	10	1
Cadmium (Cd)	1	0.1
Mercury (Hg)	0.2	0.02
Lead (Pb)	5	0.5
Antimony (Sb)	20	2
Selenium (Se)	2	0.2
Tin (Sn)	20	2
Thallium (TI)	10	1
Cyanide (Cn)	10	1
Asbestos	na	na

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TABLE A-1

SOUTH TACOMA SWAMP
PRELIMINARY SITE INVESTIGATION
DETECTION LIMIT SUMMARY - INORGANICS AND OTHER POLLUTANTS
(Continued)

LABORATORY NAME	CAL	RMA
LEVEL OF ANALYSES	LL	LL
SAMPLE TYPE	Water	Soil
DETECTION LIMIT REFERENCE NO.	(11) (ug/l)	(12) (mg/kg or ppm)
Other Pollutants		
Sulfide (S-)	50	5
Ammonia (NH_3)	100	10
Chlorides	1000	3000
Nitrate-N	10	100
Calcium (Ca)	na	10
Magnesium (Mg)	na	10
Sodium (Na)	na	50

RMA-Rocky Mountain Analytical
CAL-California Analytical Laboratories, Inc.
na-Not analyzed by specific laboratory
LL-Low level
ML-Medium Level

TABLE A-2
SOUTH TACOMA SWAMP
PRELIMINARY SITE INVESTIGATION
SURFACE-WATER ANALYSES

SMO TRAFFIC NOS.	T1374/ MT9470	T1375/ MT9471	T1376/ MT9472	T1377/ MT9473	T1378/ MT9474	T1379/ MT9475	T1380/ MT9476	T1381/ MT9477	T1382/ MT9478	T1383/ MT9430
B&V SAMPLE NO.	CBS-14-SW-01	CBS-15-SW-01	CBS-16-SW-01	CBS-17-SW-01	CBS-18-SW-01	CBS-19-SW-01	CBS-20-SW-01	CBS-21-SW-01	CBS-22-SW-01	CBS-23-SW-01
DATE SAMPLED	10-22-82	10-22-82	10-22-82	10-22-82	10-25-82	10-25-82	10-25-82	10-25-82	10-25-82	10-25-82
DETECTION LIMIT REFERENCE NO.	(4)	(4)	(5)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Base/Neutral Compounds						(ug/l)				
1,2-diphenylhydrazine (as azobenzene)	nd	nd	nd	nd	nd	3.1*	nd	nd	nd	nd
bis (2-ethylhexyl) phthalate[1]	nd	3.3*	1.2*	1.0*	nd	nd	nd	nd	nd	nd
Volatiles										
1,1,1-trichloroethane	nd	8.4*	nd	nd	nd	nd	nd	nd	nd	nd
methylene chloride[1]	8.6*	28	9.7*	9.0*	5.2*	5.3*	5.6*	6.3*	4.6*	4.8*
trichlorofluoromethane	nd	18	nd	nd	nd	nd	nd	nd	nd	nd
DETECTION LIMIT REFERENCE NO.	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)
Inorganics										
Aluminum (Al)	460	260	nd	230	nd	nd	nd	nd	280	nd
Boron (B)	320	370	190	180	870	820	830	890	1700	150
Barium (Ba)	nd	nd	nd	nd	nd	nd	nd	nd	220	nd
Iron (Fe)	470	270	240	270	390	810	780	880	470	nd
Manganese (Mn)	28	27	27	24	27	57	66	350	29	nd
Zinc (Zn)	100	100	65	77	110	160	85	280	51	16
Cadmium (Cd)	nd	nd	nd	nd	nd	nd	nd	nd	nd	14
Lead (Pb)	29	14	14	17	nd	nd	nd	nd	nd	nd
Cyanide (CN)	17	10	17	17	nd	nd	nd	nd	16	nd

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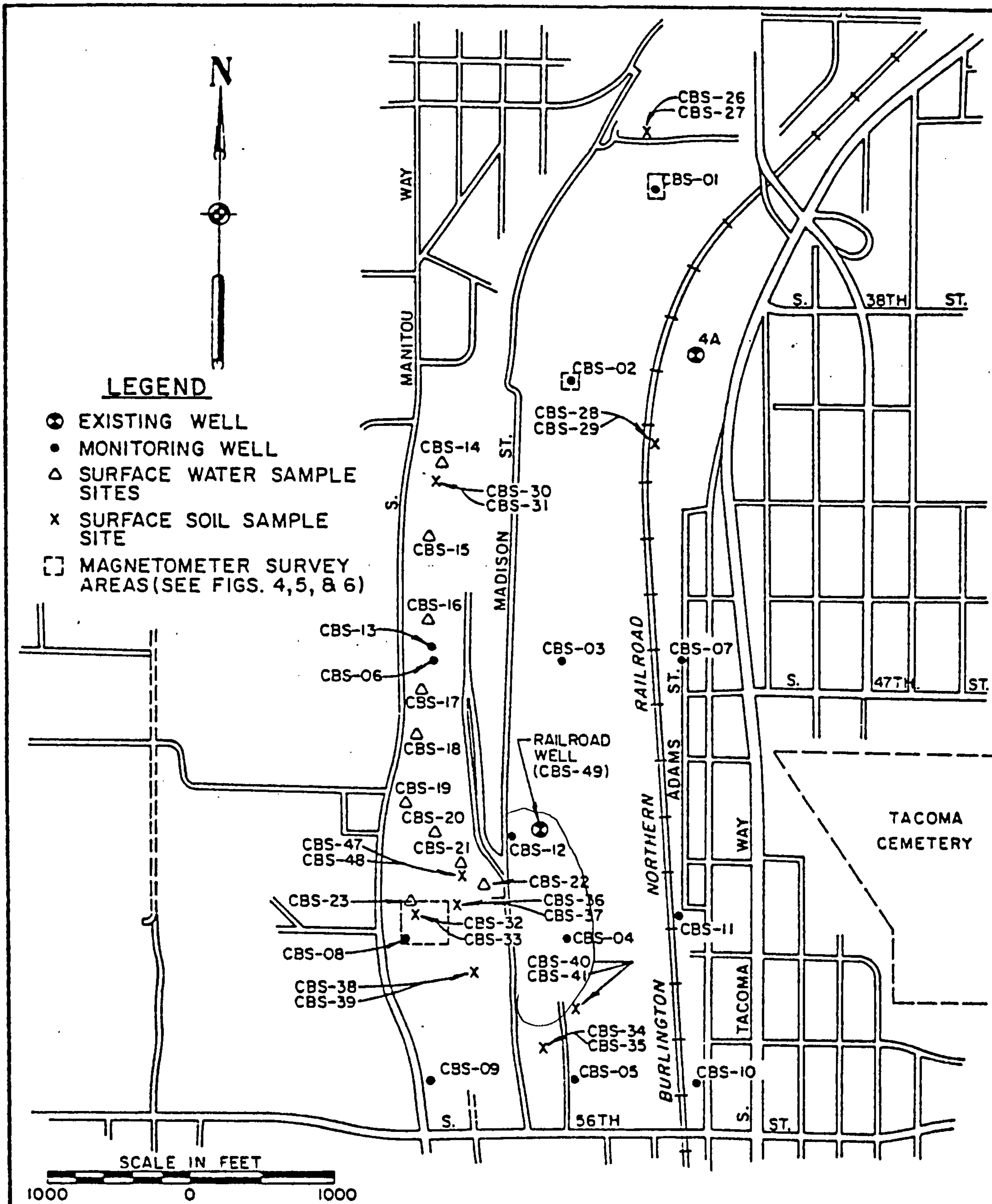
TABLE A-2
SOUTH TACOMA SWAMP
PRELIMINARY SITE INVESTIGATION
SURFACE-WATER ANALYSES
(Continued)

SMO TRAFFIC NOS.	T1374/ MT9470	T1375/ MT9471	T1376/ MT9472	T1377/ MT9473	T1378/ MT9474	T1379/ MT9475	T1380/ MT9476	T1381/ MT9477	T1382/ MT9478	T1383/ MT9430
B&V SAMPLE NO.	CBS-14-SW-01	CBS-15-SW-01	CBS-16-SW-01	CBS-17-SW-01	CBS-18-SW-01	CBS-19-SW-01	CBS-20-SW-01	CBS-21-SW-01	CBS-22-SW-01	CBS-23-SW-01
DATE SAMPLED	10-22-82	10-22-82	10-22-82	10-22-82	10-25-82	10-25-82	10-25-82	10-25-82	10-25-82	10-25-82
DETECTION LIMIT REFERENCE NO.	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)
<u>Other Pollutants</u>						(ug/l)				
Sulfide	210	nd	nd	nd	330	360	180	130	nd	nd
Ammonia	nd	nd	nd	nd	400	520	400	640	nd	nd
						(mg/l)				
Chlorides	37	38	41	41	66	66	78	255	47	13
Nitrate-N	.03	nd	.03	.02	nd	0.2	0.92	0.99	1.0	nd

*-Below quantitation limit
nd-Not detected
1-Detected in laboratory blanks
All other priority pollutants not detected



SAMPLE LOCATION AND VICINITY MAP

PRELIMINARY FIELD INVESTIGATION
SOUTH TACOMA SWAMP
TACOMA, WASHINGTON

FIGURE 1

TABLE A-3
SOUTH TACOMA SWAMP
PRELIMINARY SITE INVESTIGATION
GROUND-WATER ANALYSES

SMO TRAFFIC NOS.	T1361/ MT9457	T1391/ MT9479	T1362/ MT9458	T1392/ MT9480	T1363/ MT9459	T1393/ MT9481	T1364/ MT9460	T1394/ MT9482	T1365/ MT9461	T1395/ MT9483	T1366/ MT9462	T1396/ MT9484	T1367 MT9463
B&V SAMPLE NO.	CBS-01- GW-01	CBS-01 GW-02	CBS-02- GW-01	CBS-02- GW-02	CBS-03- GW-01	CBS-03- GW-02	CBS-04- GW-01	CBS-04- GW-02	CBS-05- GW-01	CBS-05- GW-02	CBS-06- GW-01	CBS-06- GW-02	CBS-07- GW-01
DATE SAMPLED	10-20-82	11-10-82	10-20-82	11-10-82	10-20-82	11-10-82	10-20-82	11-11-82	10-19-82	11-04-82	10-21-82	11-11-82	10-19-82
DETECTION LIMIT REFERENCE NO.	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(5)	(4)	(4)	(4)
Acid Compounds						(ug/1)							
pentachlorophenol	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	1.7*	nd	nd
Base/Neutral Compounds													
bis (2-ethylhexyl) phthalate	nd	nd	nd	nd	nd	nd	1.4*	nd	nd	nd	5.8*	nd	nd
Volatiles													
1,1,1-trichloroethane	nd	nd	7.7*	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
chloroform	nd	nd	nd	nd	3.9*	nd	nd	nd	nd	nd	nd	nd	nd
methylene chloride[1]	7.9*	7.5*	21	7.0*	7.6*	7.0*	8.5*	7.1*	5.1*	5.7*	8.2*	6.8*	4.6*
trichlorofluoromethane	nd	nd	nd	16	nd	nd	nd	nd	nd	nd	nd	nd	nd
trichloroethylene	nd	nd	nd	nd	4.9*	6.9*	2.1*	nd	nd	nd	nd	nd	nd
(Non-Priority Pollutants)													
acetone	nd	nd	89	nd	18	nd	nd	nd	35	152	nd	nd	430
DETECTION LIMIT REFERENCE NO.	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)
Inorganics													
Boron (B)	nd	530	nd	1900	nd	960	1000	2000	nd	640	110	800	nd
Copper (Cu)	nd	nd	nd	43	nd	nd	nd	nd	nd	nd	nd	45	nd
Iron (Fe)	nd	45	nd	88	nd	nd	nd	57	nd	81	290	1100	nd
Manganese (Mn)	nd	42	nd	24	nd	16	nd	nd	nd	nd	260	330	nd
Zinc (Zn)	nd	250	12	180	15	150	nd	160	nd	650	52	150	nd
Cadmium (Cd)	nd	nd	nd	nd	6.5	nd	nd	nd	nd	nd	nd	nd	nd
Mercury (Hg)	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.62	nd
Cyanide (CN)	nd	nd	110	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

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U.S. ENVIRONMENTAL PROTECTION AGENCY
EPA CONTRACT NO. 68-03-1614
WORK ASSIGNMENT NO. Z-3-6

TABLE A-3
SOUTH TACOMA SWAMP
PRELIMINARY SITE INVESTIGATION
GROUND-WATER ANALYSES
(Continued)

BLACK & VEATCH
KANSAS CITY, MO

SMO TRAFFIC NOS.	T1361/ MT9457	T1391/ MT9479	T1362/ MT9458	T1392/ MT9480	T1363/ MT9459	T1393/ MT9481	T1364/ MT9460	T1394/ MT9482	T1365/ MT9461	T1395/ MT9483	T1366/ MT9462	T1396/ MT9484	T1367 MT9463
B&V SAMPLE NO.	CBS-01-GW-01	CBS-01 GW-02	CBS-02-GW-01	CBS-02-GW-02	CBS-03-GW-01	CBS-03-GW-02	CBS-04-GW-01	CBS-04-GW-02	CBS-05-GW-01	CBS-05-GW-02	CBS-06-GW-01	CBS-06-GW-02	CBS-07-GW-01
DATE SAMPLED	10-20-82	11-10-82	10-20-82	11-10-82	10-20-82	11-10-82	10-20-82	11-11-82	10-19-82	11-4-82	10-21-82	11-11-82	10-19-82
DETECTION LIMIT REFERENCE NO.	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)
Other Pollutants						(ug/1)							
Ammonia	370	190	370	440	nd	nd	200	nd	nd	nd	1760	1200	240
Sulfide	70	nd	nd	nd	nd	nd	130	nd	nd	nd	nd	nd	nd
						(mg/1)							
chlorides	12	1.0	4.0	3.0	2.0	nd	1.0	3.0	7.0	nd	350	430	6.0
Nirate-N	0.03	1.4	0.08	2.3	0.02	0.98	0.04	1.7	0.03	0.44	nd	0.69	0.06

nd-Not detected
1-Detected in laboratory blanks
All other priority pollutants not detected
* below quantitation limit

U.S. ENVIRONMENTAL PROTECTION AGENCY
EPA CONTRACT NO. 68-03-1614
WORK ASSIGNMENT NO. Z-3-6

TABLE A-3
SOUTH TACOMA SWAMP
PRELIMINARY SITE INVESTIGATION
GROUND-WATER ANALYSES

BLACK & VEATCH
KANSAS CITY, MO

SMO TRAFFIC NOS.	T1397/ MT9485	T1368/ MT9464	T1398/ MT9486	T1369/ MT9465	T1399/ MT9487	T1370/ MT9466	T1400/ MT9488	T1371/ MT9467	T1401/ MT9489	T1372/ MT9468	T1402/ MT9490	T1373/ MT9469	T1403/ MT9491
B&V SAMPLE NO.	CBS-07-GW-02	CBS-08-GW-01	CBS-08-GW-02	CBS-09-GW-01	CBS-09-GW-02	CBS-10-GW-01	CBS-10-GW-02	CBS-11-GW-01	CBS-11-GW-02	CBS-12-GW-01	CBS-12-GW-02	CBS-13-GW-01	CBS-13 GW-02
DATE SAMPLED	11-4-82	10-21-82	11-11-82	10-21-82	11-11-82	10-19-82	11-4-82	10-19-82	11-4-82	10-21-82	11-10-82	11-16-82	11-30-82
DETECTION LIMIT REFERENCE NO.	(4)	(4)	(4)	(6)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Acid Compounds							(ug/l)						
2,4-dimethylphenol	nd	nd	9.8*	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
pentachlorophenol	nd	nd	nd	nd	nd	nd	nd	nd	nd	3.0*	nd	nd	nd
Base/Neutral Compounds													
acenaphthene	nd	nd	6.5*	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
fluoranthane	nd	nd	2.7*	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
naphthalene	nd	25	28	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
bis (2-ethylhexyl) phthalate[1]	2.1*	3.3*	1.4*	nd	nd	nd	nd	nd	nd	1.4*	1.3*	1.2*	1.7*
di-n-butyl phthalate[1]	nd	nd	nd	nd	nd	nd	1.5*	nd	1.5*	nd	nd	2.4*	1.3*
fluorene	nd	nd	6.2*	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
phenanthrene	nd	4.9*	8.7*	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
pyrene	nd	1.4*	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Volatiles													
benzene	nd	nd	nd	nd	nd	nd	1.0*	nd	nd	nd	nd	nd	nd
1,1,1-trichloroethane	nd	nd	nd	nd	nd	nd	nd	nd	nd	6.7*	9.2*	nd	nd
ethylbenzene	nd	2.1*	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
methylene chloride[1]	6.0*	8.3*	6.9*	9.3*	7.0*	4.7*	5.9*	4.9*	5.7*	8.9*	7.2*	6.4*	6.6*
trichlorofluoromethane	nd	nd	nd	nd	nd	nd	4.0*	nd	nd	nd	nd	nd	nd
tetrachloroethylene	nd	nd	nd	nd	nd	nd	nd	nd	nd	3.5*	3.0*	nd	nd
toluene	nd	3.5*	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
trichloroethylene	nd	nd	nd	nd	3.3*	nd	nd	nd	nd	nd	nd	nd	1.4*

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TABLE A-3
SOUTH TACOMA SWAMP
PRELIMINARY SITE INVESTIGATION
GROUND-WATER ANALYSES
(Continued)

SMO TRAFFIC NOS.	T1397/ MT9485	T1368/ MT9464	T1398/ MT9486	T1369/ MT9465	T1399/ MT9487	T1370/ MT9466	T1400/ MT9488	T1371/ MT9467	T1401/ MT9489	T1372/ MT9468	T1402/ MT9490	T1373/ MT9469	T1403/ MT9491
B&V SAMPLE NO.	CBS-07-GW-02	CBS-08-GW-01	CBS-08-GW-02	CBS-09-GW-01	CBS-09-GW-02	CBS-10-GW-01	CBS-10-GW-02	CBS-11-GW-01	CBS-11-GW-02	CBS-12-GW-01	CBS-12-GW-02	CBS-13-GW-01	CBS-13 GW-02
DATE SAMPLED	11-4-82	10-21-82	11-11-82	10-21-82	11-11-82	10-19-82	11-4-82	10-19-82	11-4-82	10-21-82	11-10-82	11-16-82	11-30-82
DETECTION LIMIT REFERENCE NO.	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)
Inorganics							(ug/l)						
Boron (B)	620	1200	1600	130	1000	nd	640	nd	1080	nd	430	810	600
Barium (Ba)	nd	nd	490	nd	200	nd	nd	nd	nd	nd	nd	nd	nd
Copper (Cu)	nd	nd	nd	nd	nd	nd	nd	nd	46	nd	nd	nd	nd
Iron (Fe)	nd	13600	17500	15000	17500	nd	nd	nd	40	nd	44	nd	nd
Manganese (Mn)	nd	1400	1300	1100	1200	nd	nd	nd	16	nd	13	nd	nd
Zinc (Zn)	380	20	100	45	160	nd	350	nd	300	32	100	59	nd
Arsenic (As)	nd	18	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Cadmium (Cd)	nd	nd	nd	1.6	nd	nd	nd	nd	nd	nd	nd	nd	nd
Mercury (Hg)	0.73	nd	nd	nd	nd	nd	nd	nd	0.94	nd	nd	nd	1.2
Cyanide (CN)	nd	17	nd	nd	nd	nd	nd	nd	nd	17	nd	nd	nd
Other Pollutants													
Ammonia	nd	930	530	1030	620	nd	nd	nd	nd	140	nd	nd	nd
							(mg/l)						
Chlorides	7.0	30	35	4.0	3.0	10	12	6.0	nd	4.0	1.0	200	160
Nitrate-N	2.8	2.2	0.4	19	0.32	0.05	5.3	0.04	2.0	0.64	2.8	0.12	nd

*-Below quantitation limit
nd-Not detected

1-Detected in laboratory blanks
All other priority pollutants not detected

TABLE A-3
SOUTH TACOMA SWAMP
PRELIMINARY SITE INVESTIGATION
GROUND-WATER ANALYSES

SMO TRAFFIC NOS.	T1341/ MT9495
B&V SAMPLE NO.	CBS-49- GW-01
DATE SAMPLED	12-2-82
DETECTION LIMIT REFERENCE NO.	(4)
Base/Neutral Compounds	(ug/l)
bis (2-ethylhexyl) phthalate[1]	1.2*
Volatiles	
methylene chloride[1]	12
trichloroethylene	1.9*
DETECTION LIMIT REFERENCE NO.	(11)
Inorganics	
Boron (B)	830
Iron (Fe)	110
Manganese (Mn)	180
Zinc (Zn)	140
Other Pollutants	
Ammonia	250
	(mg/l)
Chlorides	11
Nitrate-N	nd

*-Below quantitation limit
1-Detected in laboratory blank
All other priority pollutants not detected
nd - not detected

U.S. ENVIRONMENTAL PROTECTION AGENCY
EPA CONTRACT NO. 68-03-1614
WORK ASSIGNMENT NO. Z-3-6

TABLE A-4
SOUTH TACOMA SWAMP
PRELIMINARY SITE INVESTIGATION
SURFACE SOIL ANALYSES

BLACK & VEATCH
KANSAS CITY, MO

SMO TRAFFIC NO.	T1322/ MT8911	T1323/ MT8912	T1324/ MT8913	T1325/ MT8914	T1326/ MT8915	T1327/ MT8916	T1328/ MT8917	T1329/ MT8918	T1330/ MT8919	T1331/ MT8921	T1332/ MT8922	T1333/ MT8923
B&V SAMPLE NO.	CBS-26-SL-01	CBS-27-SL-01	CBS-28-SL-01	CBS-29-SL-01	CBS-30-SL-01	CBS-31-SL-01	CBS-32-SL-01	CBS-33-SL-01	CBS-34-SL-01	CBS-35-SL-01	CBS-36-SL-01	CBS-37-SL-01
DATE SAMPLED	10-18-82	10-18-82	10-82-82	10-18-82	10-18-82	10-18-82	10-18-82	10-18-82	10-18-82	10-18-82	10-18-82	10-18-82
DETECTION LIMIT REFERENCE NO.	(3)	(2)	(2)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Acid Compounds							(ug/Kg)					
phenol	nd	nd	nd	nd	nd	400K	nd	nd	nd	nd	nd	nd
(Non-priority pollutants)												
benzoic acid	100000K	nd	nd	nd	11000	nd	nd	nd	nd	nd	nd	nd
Base/Neutral Compounds												
fluoranthene	nd	nd	nd	nd	nd	nd	nd	nd	2700	880	560	880
naphthalene	nd	nd	nd	7600	nd	nd	nd	nd	nd	nd	nd	nd
bis (2-ethylhexyl) phthalate	29000	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
di-n-butyl phthalate	nd	nd	nd	nd	520	nd	nd	nd	nd	nd	nd	nd
benzo(a) anthracene	nd	nd	nd	nd	nd	nd	nd	nd	1300	520	640	960
benzo(a) pyrene	nd	nd	nd	nd	nd	nd	nd	nd	1100	800K	2000	1800
3,4-benzofluoranthene	nd	nd	nd	nd	nd	nd	nd	nd	1200	800	2100	1500
benzo(k)fluoranthene	nd	nd	nd	nd	nd	nd	nd	nd	1200	800K	1000	1500
chrysene	10000K	nd	nd	nd	nd	nd	nd	nd	3000	560	1000	1200
benzo(ghi)perylene	nd	nd	nd	nd	nd	nd	nd	nd	800K	nd	1300	1600
phenanthrene	10000K	nd	nd	nd	nd	nd	nd	nd	1300	800	400K	400K
dibenzo(a,h)anthracene	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	1000	nd
indeno(1,2,3-cd)pyrene	nd	nd	nd	nd	nd	nd	nd	nd	800K	nd	1100	1800
pyrene	nd	nd	nd	nd	nd	nd	nd	nd	2900	1100	880	1100
(Non-priority pollutants)									3.5		7	
2-methylnapthalene	nd	nd	nd	800K	nd	nd	nd	nd	nd	nd	nd	nd

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U.S. ENVIRONMENTAL PROTECTION AGENCY
EPA CONTRACT NO. 68-03-1614
WORK ASSIGNMENT NO. Z-3-6

TABLE A-4
SOUTH TACOMA SWAMP
PRELIMINARY SITE INVESTIGATION
SURFACE SOIL ANALYSES
(Continued)

BLACK & VEATCH
KANSAS CITY, MO

SMO TRAFFIC NO.	T1322/ MT8911	T1323/ MT8912	T1324/ MT8913	T1325/ MT8914	T1326/ MT8915	T1327/ MT8916	T1328/ MT8917	T1329/ MT8918	T1330/ MT8919	T1331/ MT8921	T1332/ MT8922	T1333/ MT8923
B&V SAMPLE NO.	CBS-26-SL-01	CBS-27-SL-01	CBS-28-SL-01	CBS-29-SL-01	CBS-30-SL-01	CBS-31-SL-01	CBS-32-SL-01	CBS-33-SL-01	CBS-34-SL-01	CBS-35-SL-01	CBS-36-SL-01	CBS-37-SL-01
DATE SAMPLED	10-18-82	10-18-82	10-82-82	10-18-82	10-18-82	10-18-82	10-18-82	10-18-82	10-18-82	10-18-82	10-18-82	10-18-82
DETECTION LIMIT REFERENCE NO.	(3)	(2)	(2)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Volatiles												
1,2-dichloroethane	nd	nd	nd	nd	nd	nd	nd	1.4*	nd	nd	nd	nd
methylene chloride[1]	25	4.8	23	2.0	5.0	6.5	7.0	2.0*	nd	8.0	53	19
trichlorofluoromethane	10	3.3	5.6	2.1	2.5	2.5K	nd	2.0*	nd	4.0	4.0	nd
(Non-priority pollutants)												
acetone	nd.	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	33
Pesticides												
PCB-1248	57900	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
PCB-1254	nd	1444[2]	nd	nd	nd	nd	nd	nd	0.54	nd	nd	nd
DETECTION LIMIT REFERENCE NO.	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)
Inorganics							(mg/Kg)					
Aluminum (Al)	1100	1900	1000	3500	2200	2300	540	360	1200	3400	1200	510
Boron (B)	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	22	nd
Barium (Ba)	34	22	nd	18	nd	23	17	nd	46	18	62	48
Chromium (Cr)	2.8	nd	nd	nd	nd	nd	nd	nd	nd	nd	54	2.8
Copper (Cu)	31	nd	nd	6.9	6.8	nd	nd	nd	330	52	21	nd
Iron (Fe)	470	680	250	440	310	260	690	410	1040	2800	3000	920
Manganese (Mn)	35	60	41	83	10	32	25	21	430	1800	230	46
Nickel (Ni)	nd	nd	nd	nd	nd	nd	nd	nd	35	5.7	15	nd
Zinc (Zn)	91	10	19	47	6.8	2.1	5.8	2.7	120	15	21	3.8

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U.S. ENVIRONMENTAL PROTECTION AGENCY
EPA CONTRACT NO. 68-03-1614
WORK ASSIGNMENT NO. Z-3-6

TABLE A-4
SOUTH TACOMA SWAMP
PRELIMINARY SITE INVESTIGATION
SURFACE SOIL ANALYSES
(Continued)

SMO TRAFFIC NO.	T1322/ MT8911	T1323/ MT8912	T1324/ MT8913	T1325/ MT8914	T1326/ MT8915	T1327/ MT8916	T1328/ MT8917	T1329/ MT8918	T1330/ MT8919	T1331/ MT8921	T1332/ MT8922	T1333/ MT8923
B&V SAMPLE NO.	CBS-26-SL-01	CBS-27-SL-01	CBS-28-SL-01	CBS-29-SL-01	CBS-30-SL-01	CBS-31-SL-01	CBS-32-SL-01	CBS-33-SL-01	CBS-34-SL-01	CBS-35-SL-01	CBS-36-SL-01	CBS-37-SL-01
DATE SAMPLED	10-18-82	10-18-82	10-82-82	10-18-82	10-18-82	10-18-82	10-18-82	10-18-82	10-18-82	10-18-82	10-18-82	10-18-82
DETECTION LIMIT REFERENCE NO.	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)
<u>Inorganics</u>												
Arsenic (As)	4.6	2.2	1.3	5.4	4.3	1.4	nd	nd	110	6.0	2.0	nd
Cadmium (Cd)	0.2	0.2	0.3	0.2	0.4	0.5	nd	0.7	0.2	0.4	nd	3.4
Lead (Pb)	72	6.5	8.8	14	86	12	2.8	1.4	200	31	35	17
Antimony (Sb)	nd	nd	nd	nd	nd	nd	nd	nd	13	3.6	nd	nd
Tin (Sn)	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

*-Below quantitation limit
1-Detected in laboratory blank
2-PCB cannot be confirmed by GC/MS

K-Detected below but more than one half of specified detection limti
All other priority pollutants not detected

TABLE A-4
SOUTH TACOMA SWAMP
PRELIMINARY SITE INVESTIGATION
SURFACE SOIL ANALYSES
(Continued)

SMO TRAFFIC NO.	T1334/ MT8924	T1335/ MT8925	T1336/ MT8926	T1337/ MT8927	T1320/ MT9424	T1321/ MT9425
B&V SAMPLE NO.	CBS-38-SL-01	CBS-39-SL-01	CBS-40-SL-01	CBS-41-SL-01	CBS-47-SL-01	CBS-48-SL-01
DATE SAMPLED	10-18-82	10-18-82	10-82-82	10-18-82	10-18-82	10-18-82
DETECTION LIMIT REFERENCE NO.	(1)	(1)	(1)	(1)	(1)	(1)
Acid Compounds			(ug/Kg)			
phenol	nd	nd	nd	nd	3600	1900
Base/Neutral Compounds						
acenaphthene	400K	nd	nd	nd	nd	nd
fluoranthene	1000	nd	nd	400K	nd	400K
naphthalene	nd	nd	nd	nd	nd	400K
benzo(a)anthracene	1600	nd	nd	nd	nd	nd
benzo(a)pyrene	1800	nd	nd	nd	nd	nd
3,4-benzobluoranthene	1600	nd	nd	nd	nd	nd
benzo(k)fluoranthene	1600	nd	nd	nd	nd	nd
chrysene	1500	nd	nd	400K	nd	nd
benzo(ghi)perylene	1200	nd	nd	nd	nd	nd
phenanthrene	400	nd	nd	400K	nd	400K
dibenzo(a,h)anthracene	1300	nd	nd	nd	nd	nd
indeno(1,2,3-cd)pyrene	2100	nd	nd	nd	nd	nd
pyrene	1400	nd	400K	400K	nd	400K
Volatiles				(ug/Kg)		
methylene chloride[1]	15	27	14	14	3.6	3.7
trichlorofluormethane	nd	14	nd	nd	2.7	4.3
trichloroethylene	nd	nd	32	nd	nd	nd

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TABLE A-4
SOUTH TACOMA SWAMP
PRELIMINARY SITE INVESTIGATION
SURFACE SOIL ANALYSES
(Continued)

SMO TRAFFIC NO.	T1334/ MT8924	T1335/ MT8925	T1336/ MT8926	T1337/ MT8927	T1320/ MT9424	T1321/ MT9425
B&V SAMPLE NO.	CBS-38-SL-01	CBS-39-SL-01	CBS-40-SL-01	CBS-41-SL-01	CBS-47-SL-01	CBS-48-SL-01
DATE SAMPLED	10-18-82	10-18-82	10-82-82	10-18-82	10-18-82	10-18-82
DETECTION LIMIT REFERENCE NO.	(1)	(1)	(1)	(1)	(1)	(1)
Inorganics				(mg/Kg)		
Aluminum (Al)	1000	3900	1600	1600	670	1700
Barium (Ba)	71	nd	56	56	140	68
Chromium (Cr)	24	nd	nd	nd	20	11
Copper (Cu)	28	nd	20	2800	51	29
Iron (Fe)	4900	230	5800	2500	6200	3600
Manganese (Mn)	230	7.5	720	410	1030	210
Nickel (Nk)	20	nd	nd	nd	69	46
Zinc (Zn)	41	7.5	11	1800	19	9.1
Arsenic (As)	2.9	8.0	2.3	6.7	nd	1.6
Cadmium (Cd)	0.4	0.5	0.2	1.7	0.4	nd
Lead (Pb)	65	4.1	54	4300	23	16
Tin (Sn)	nd	nd	nd	4.7	nd	nd

nd-Not detected
K-Detected below but greater than one hald of specified detection limit
1-Detected in laboratory blanks
All other priority pollutants not detected

TABLE A-5
SOUTH TACOMA SWAMP
PRELIMINARY SITE INVESTIGATION
SUBSURFACE SOIL ANALYSES

SMO TRAFFIC NOS.	T1294/ MT8998	T1295/ MT8999	T1296/ MT9000	T1297/ MT9401	T1298/ MT9402	T1299/ MT9403	T1300/ MT9404	T1301/ MT9405	T1302/ MT9406	T1303/ MT9407	T1304/ MT9408	T1305/ MT9409	T1306/ MT9410
B&V SAMPLE NO.	CBS-01-SS-01	CBS-01-SS-02	CBS-02-SS-01	CBS-02-SS-02	CBS-03-SS-01	CBS-03-SS-02	CBS-04-SS-01	CBS-04-SS-02	CBS-05-SS-01	CBS-05-SS-02	CBS-06-SS-01	CBS-06-SS-02	CBS-07-SS-01
ELEVATION (FEET)**	216	211	227	212	221	211	233	213	224	214	220	210	236
DATE SAMPLED	10-11-82	10-11-82	10-13-82	10-13-82	10-9-82	10-9-82	10-11-82	10-11-82	10-11-82	10-11-82	10-12-82	10-12-82	10-12-82
DETECTION LIMIT REFERENCE NO.	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Base/Neutral Compounds							(ug/Kg)						
di-n-butyl phthalate	nd	nd	nd	nd	nd	nd	nd	nd	400K	nd	nd	nd	nd
Volatiles													
methylene chloride[1]	24	10	5.0	31	9.4	11	6.2	32	24	29	74	22	8.7
trichlorofluoromethane	nd	nd	nd	nd	nd	nd	nd	nd	nd	2.5K	nd	nd	nd
(Non-Priority pollutants)													
acetone[2]	26*	nd	nd	nd	nd	nd	nd	2.7*	nd	nd	nd	nd	nd
DETECTION LIMIT REFERENCE NO.	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)
Inorganics							(mg/Kg)						
Aluminum (Al)	940	950	1000	580	990	80	780	820	1100	720	1400	480	830
Barium (B)	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Chromium (Cr)	nd	1.8	nd	nd	1.2	nd	1.3	2.2	2.2	1.5	1.2	nd	nd
Copper (Cu)	nd	nd	nd	nd	7.2	nd	nd	nd	nd	nd	nd	nd	nd
Iron (Fe)	790	860	1370	480	990	760	460	830	1350	790	930	840	730
Manganese (Mn)	59	64	30	18	89	46	33	41	191	108	23	13	78
Nickel (Ni)	nd	nd	nd	nd	nd	nd	nd	4.6	nd	nd	5.1	4.1	4.9

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TABLE A-5
SOUTH TACOMA SWAMP
PRELIMINARY SITE INVESTIGATION
SUBSURFACE SOIL ANALYSES
(Continued)

SMO TRAFFIC NOS.	T1294/ MT8998	T1295/ MT8999	T1296/ MT9000	T1297/ MT9401	T1298/ MT9402	T1299/ MT9403	T1300/ MT9404	T1301/ MT9405	T1302/ MT9406	T1303/ MT9407	T1304/ MT9408	T1305/ MT9409	T1306/ MT9410
B&V SAMPLE NO.	CBS-01-SS-01	CBS-01-SS-02	CBS-02-SS-01	CBS-02-SS-02	CBS-03-SS-01	CBS-03-SS-02	CBS-04-SS-01	CBS-04-SS-02	CBS-05-SS-01	CBS-05-SS-02	CBS-06-SS-01	CBS-06-SS-02	CBS-07-SS-01
ELEVATION (FEET)**	216	211	227	212	221	211	233	213	224	214	220	210	236
DATE SAMPLED	10-11-82	10-11-82	10-13-82	10-13-82	10-9-82	10-9-82	10-11-82	10-11-82	10-11-82	10-11-82	10-12-82	10-12-82	10-12-82
DETECTION LIMIT REFERENCE NO.	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Vanadium (V)	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Zinc (Zn)	4.2	4.9	5.7	2.9	6.2	5.1	1.9	5.0	6.2	5.1	6.1	4.2	4.8
Arsenic (As)	nd	nd	nd	nd	nd	nd	nd	nd	1.4	nd	2.2	nd	nd
Cadmium (Cd)	nd	nd	nd	nd	nd	nd	0.2	0.2	nd	nd	nd	nd	nd
Lead (Pb)	1.5	1.2	1.5	0.6	2.3	3.6	1.0	1.3	2.3	1.1	5.0	1.0	1.3

nd-Not detected
All other priority pollutants not detected
K-Detected below but greater than one half of specified limit
na-Not analyzed

1-Detected in laboratory blanks in a range from 1.4 to 22 ppb
2-Compound used in rinsing laboratory glassware
*-Below quantitation limit
**-USGS Datum

U.S. ENVIRONMENTAL PROTECTION AGENCY
EPA CONTRACT NO. 68-03-1614
WORK ASSIGNMENT NO. Z-3-6

TABLE A-5
SOUTH TACOMA SWAMP
PRELIMINARY SITE INVESTIGATION
SUBSURFACE SOIL ANALYSES

BLACK & VEATCH
KANSAS CITY, MO

SMO TRAFFIC NOS.	T1307/ MT9411	T1308/ MT9412	T1309/ MT9413	T1310/ MT9414	T1311/ MT9415	T1312/ MT9416	T1313/ MT9417	T1314/ MT9418	T1315/ MT9419	T1316/ MT9420	T1317/ MT9421	T1318/ MT9422	T1319/ MT9423
B&V SAMPLE NO.	CBS-07-SS-02	CBS-08-SS-01	CBS-08-SS-02	CBS-09-SS-01	CBS-09-SS-02	CBS-10-SS-01	CBS-10-SS-02	CBS-11-SS-01	CBS-11-SS-02	CBS-12-SS-01	CBS-12-SS-02	CBS-13 SS-01	CBS-13-SS-02
ELEVATION (FEET)*	207	211	206	214	209	232	217	236	216	225	210	185	155
DATE SAMPLED	10-12-82	10-13-82	10-13-82	10-11-82	10-11-82	10-11-82	10-11-82	10-14-82	10-14-82	10-13-82	10-13-82	11-16-82	11-16-82
DETECTION LIMIT REFERENCE NO.	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)

Volatiles						(ug/Kg)							
methylene chloride[1]	7.7	na[2]	110	62	28	34	44	9.9	31	8.1	62	3.8	6.7
trichlorofluoromethane	nd	na[2]	nd	3.6	6.0	4.6	4.2	4.7	2.7	6.0	nd	nd	nd
Pesticides													
beta-endosulfan	nd	nd	nd	nd	nd	nd	nd	6.8[3]	nd	nd	nd	nd	nd
DETECTION LIMIT REFERENCE NO.	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)
Inorganics						(mg/Kg)							
Aluminum (Al)	570	1300	520	620	490	850	590	550	580	610	620	1168	1321
Barium (Ba)	nd	45	nd	nd	nd	nd	nd	nd	nd	nd	nd	11	11
Chromium (Cr)	nd	4.4	nd	nd	nd	nd	nd	nd	nd	nd	nd	1.4	2.3
Copper	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	5.4	nd
Iron (Fe)	620	2900	1300	1460	1310	720	560	330	420	580	530	1944	1831
Manganese (Mn)	31	42	25	21	17	63	33	36	23	20	36	28	38
Nickel (Ni)	nd	6.4	6.3	5.6	4.2	nd	nd	nd	nd	nd	nd	nd	9.3
Vanadium (V)	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	5.0	4.2
Zinc (Zn)	3.9	4.0	12	5.3	5.2	4.8	3.9	5.7	2.9	6.2	2.9	5.4	7.6
Arsenic (As)	nd	6	1.5	nd	nd	nd	1.2	1.8	1.3	1.3	1.1	1.1	1.1
Cadmium (Cd)	nd	0.2	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.2	0.6
Lead (Pb)	0.8	15.9	7.3	1.4	6.1	2.0	2.1	2.8	2.2	3.9	1.3	0.9	0.7
Tin (Sn)	nd	nd	nd	nd	nd	nd	nd	nd	nd	2.8	nd	nd	nd

Footnotes on page 4 of 4

TABLE A-5
SOUTH TACOMA SWAMP
PRELIMINARY SITE INVESTIGATION
SUBSURFACE SOIL ANALYSES

SMO TRAFFIC NOS.	T1307/ MT9411	T1308/ MT9412	T1309/ MT9413	T1310/ MT9414	T1311/ MT9415	T1312/ MT9416	T1313/ MT9417	T1314/ MT9418	T1315/ MT9419	T1316/ MT9420	T1317/ MT9421	T1318/ MT9422	T1319/ MT9423
B&V SAMPLE NO.	CBS-07-SS-02	CBS-08-SS-01	CBS-08-SS-02	CBS-09-SS-01	CBS-09-SS-02	CBS-10-SS-01	CBS-10-SS-02	CBS-11-SS-01	CBS-11-SS-02	CBS-12-SS-01	CBS-12-SS-02	CBS-13 SS-01	CBS-13-SS-02
ELEVATION (FEET)*	207	211	206	214	209	232	217	236	216	225	210	185	155
DATE SAMPLED	10-12-82	10-13-82	10-13-82	10-11-82	10-11-82	10-11-82	10-11-82	10-14-82	10-14-82	10-13-82	10-13-82	11-16-82	11-16-82
DETECTION LIMIT REFERENCE NO.	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(12)	(12)
Other Pollutants							(mg/Kg)						
Calcium	na	na	na	na	na	na	na	na	na	na	na	1072	1234
Magnesium	na	na	na	na	na	na	na	na	na	na	na	433	900
Sodium	na	na	na	na	na	na	na	na	na	na	na	141	nd

na-Not Analyzed
All other priority pollutants not detected
*USGS Datum

nd-Not detected
1-Detected in laboratory blank
2-No volatile analyses included due to laboratory accident
3-Pesticide cannot be confirmed by GC/MS

U.S. ENVIRONMENTAL PROTECTION AGENCY
EPA CONTRACT NO. 68-03-1614
WORK ASSIGNMENT NO. Z-3-6

TABLE A-6
SOUTH TACOMA SWAMP
PRELIMINARY SITE INVESTIGATION
FIELD BLANK ANALYSES

BLACK & VEATCH
KANSAS CITY, MO

SMO TRAFFIC NOS.	T1388/ HT9441	T1389/ HT9440	T1390/ HT9442
B&V SAMPLE NO.	CBS-44- GW-01	CBS-45- GW-01	CBS-46- GW-01
DATE SAMPLED	10-25-82	10-25-82	11-9-82
DETECTION LIMIT REFERENCE NO.	(4)	(4)	(4)
Base/Neutral Compounds		(ug/l)	
1,2-diphenylhydrazine (as azobenzene)	70	130	570
Volatiles			
1,1,1-tricholoromethane	nd	1.1*	2.4*
chloroform	7.8*	10	20
methylene chloride	5.4*	5.1*	7.6*
(Non-priority pollutants)			
acetone	nd	nd	37
DETECTION LIMIT REFERENCE NO.	(11)	(11)	(11)
Inorganics			
Boron (B)	700	600	450
Zinc (Zn)	21	20	240
Other Pollutants		mg/l	
Chlorides	1.5	nd	nd
Nitrate-N	0.46	0.53	0.55

nd-Not detected
*-Below quantitation limit
All other priority pollutants not detected

APPENDIX B

LOGS OF BORINGS

SOUTH TACOMA SWAMP

PRELIMINARY SITE INVESTIGATION

BORING LOG LEGEND AND NOMENCLATURE

Figures B-1 through B-27

Items shown on boring logs refer to the following:

1. Depth - Depth below reference elevation, ground surface unless otherwise shown

2. Sample - Types designated by letter

   D - Disturbed sample, obtained from auger cuttings or wash water for classification purposes only

   S - Split-spoon sample, obtained by driving 2-inch split-spoon to determine penetration resistance and allow classification

   C - Liner tube sample, obtained by penetration of thick, wall sampler containing 2-inch-diameter liner tubes (California sampler)

   U - Undisturbed sample, obtained by penetration of minimum 3-inch-diameter, thin-wall tube using an open or, where indicated, fixed-piston sampling head

   DM - Dames and Moore Sampler

   Rec - Recovery is expressed as a ratio of the length recovered to the total length pushed or driven (in inches), i.e., $\frac{8}{12}$

   Resist - Resistance is designated as follows:

   P - Sample pushed in one continuous movement by hydraulic rig action, maximum hydraulic pressure shown where pertinent

   $^{3}6_{9}$ - Numbers indicate blows per 6 inches of sampler penetration

3. Description - Description of material according to the Unified Soil Classification: word description gives soil constituents, consistency or density, and other appropriate classification characteristics. Unified Soil Classification symbols are shown on the USC column. Geologic names, where appropriate, are shown under Special Notes. A solid line indicates stratigraphic change; a dashed line indicates approximate location of stratigraphic change.

4. Special Notes and Field Observations - Pertinent observations made by inspector during drilling including type of boring, free water level, water seepage, fluid loss, hole termination depth, etc.

5. Legend -

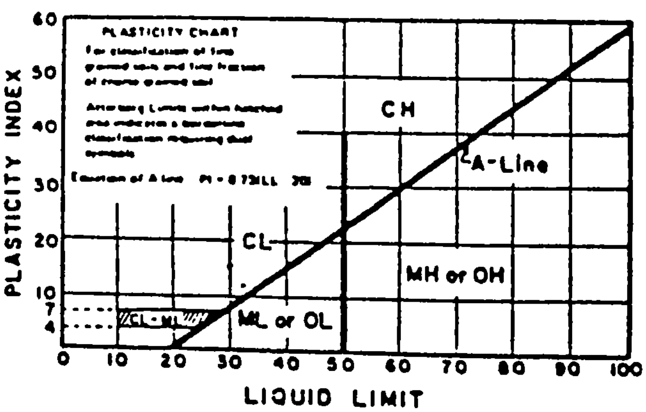
   CFA - Continuous flight auger
   ATD - At time of drilling
   AD - After drilling
   DWL - Drill water loss
   DWR - Drill water return

   ▼ Water depth at specified time after drilling

   ← Water entry depth at time of drilling

Unified Soil Classification System

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES	CLASSIFICATION CRITERIA	
COARSE GRAINED SOILS More than 50% retained on 0.075 mm (No. 200) sieve*	GRAVELS 50% or more of coarse fraction retained on 4.75 mm (No. 4) sieve	CLEAN GRAVELS	GW	Well graded gravels and gravel-sand mixtures, little or no fines	Classification on basis of percentage of fines: Less than 5% Pass 0.075 mm sieve GW, GP, SW, SP; More than 12% Pass 0.075 mm sieve GM, GC, SM, SC; 5% to 12% Pass 0.075 mm sieve Border Classification requiring use of dual symbols	$C_u = D_{60}/D_{10}$ Greater than 4; $C_z = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines		Not meeting both criteria for GW
		GRAVELS WITH FINES	GM	Silty gravels, gravel-sand-silt mixtures		Atterberg limits plot below "A" line or plasticity index less than 4 — Atterberg limits plotting in hatched area are borderline classifications requiring use of dual symbols
			GC	Clayey gravels, gravel-sand-clay mixtures		Atterberg limits plot above "A" line and plasticity index greater than 7
	SANDS More than 50% of coarse fraction passes 4.75 mm (No. 4) sieve	CLEAN SANDS	SW	Well-graded sands and gravelly sands, little or no fines		$C_u = D_{60}/D_{10}$ Greater than 6; $C_z = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3
			SP	Poorly graded sands and gravelly sands, little or no fines		Not meeting both criteria for SW
		SANDS WITH FINES	SM	Silty sands, sand-silt mixtures		Atterberg limits plot below "A" line or plasticity index less than 4 — Atterberg limits plotting in hatched area are borderline classifications requiring use of dual symbols
			SC	Clayey sands, sand-clay mixtur		Atterberg limits plot above "A" line and plasticity index greater than 7
FINE-GRAINED SOILS 50% or more passing 0.075 mm (No. 200) sieve*	SILTS AND CLAYS Liquid limit 50% or less		ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands	Plasticity chart (see below)	
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays		
			OL	Organic silts and organic silty clays of low plasticity		
	SILTS AND CLAYS Liquid limit greater than 50%		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts		
			CH	Inorganic clays of high plasticity, fat clays		
			OH	Organic clays of medium to high plasticity		
Highly Organic Soils			PT	Peat, muck and other highly organic soils	Visual-Manual Identification, See ASTM Designation D 2488.	



BORING LOG

SHEET 1 OF 2

PROJECT NAME COMMENCEMENT BAY

PROJECT NO. K81-4521

DATE 10-11-82

CBS-01

PROJECT LOCATION Tacoma, Washington

RIG Mobile B-61

LOGGED BY M. Genoud DRILLED BY R. Kring

WATER ENTERS El. 215 ATD

SURFACE ELEVATION 239 ELEVATION DATUM USC & GS

DEPTH	SAMPLE TYPE	SAMPLE REC	SAMPLE RESIST	DESCRIPTION	U.S.C.	SPECIAL NOTES AND FIELD OBSERVATIONS
0				Loose, dark brown, poorly graded, Gravelly SAND with trace of silt	SP-GP	Boring advanced with 10" diameter hollow stem augers with 11" diameter bit
	DM	12/18	3 7 8	Loose, gray, poorly graded, coarse grained GRAVELLY SAND with trace of silt		Sampler driven with 325 lbs. cable tool jars Slightly moist OVA-0.3ppm
5				Medium dense, red-yellow, poorly graded, fine to medium grained SAND with trace of silt	SP	Moist
	DM	15/18	7 11 18			OVA-Background
10						
	DM	15/18	11 20 26	Dense, gray, poorly graded, fine to medium grained SAND with some gravel and trace of silt		Moist to wet OVA-0.2ppm
15						
	DM	18/18	11 16 23			OVA-0.1ppm
20						
	DM	18/18	10 16 17	Becoming gray-yellow and medium grained		OVA-0.8ppm ← Water detected ATD
25						

WOODWARD-CLYDE CONSULTANTS

FIGURE NO. B-1

BORING LOG

SHEET 2 OF 2

PROJECT NAME COMMENCEMENT BAY

PROJECT NO. K81-4521

DATE 10-11-82

CBS-01

PROJECT LOCATION Tacoma, Washington

RIG Mobile B-61

LOGGED BY M. Genoud DRILLED BY R. Kring

WATER ENTERS El. 215 ATD

SURFACE ELEVATION 239 ELEVATION DATUM USC & GS

DEPTH	SAMPLE TYPE	SAMPLE REC	SAMPLE RESIST	DESCRIPTION	U.S.C.	SPECIAL NOTES AND FIELD OBSERVATIONS
25				SAME: Dense, gray-yellow, poorly graded, medium grained SAND with some gravel and some silty clay	SP	Saturated
	DM	18/18	6 12 20			OVA-5.4ppm
30						Bottom of boring 29.5'

WOODWARD-CLYDE CONSULTANTS

FIGURE NO. B-2

BORING LOG

SHEET 1 OF 2

PROJECT NAME COMMENCEMENT BAY

PROJECT NO. K81-4521

DATE 10-13-82

CBS-02

PROJECT LOCATION Tacoma, Washington

RIG Mobile B-61

LOGGED BY G. Hess DRILLED BY S. Sterling

WATER ENTERS El. 214 ATD

SURFACE ELEVATION 240 ELEVATION DATUM USC & GS

DEPTH	SAMPLE TYPE	SAMPLE REC	SAMPLE RESIST	DESCRIPTION	U.S.C.	SPECIAL NOTES AND FIELD OBSERVATIONS
0				Medium dense, dark brown, low plastic Clayey SILT to Silty CLAY with some fine to coarse gravel	CL-ML	Boring advanced with 10" diameter hollow stem augers with 11" diameter bit
				Medium dense, light brown-tan, fine grained, poorly graded, Silty SAND with some fine to medium gravel with trace of clay	SM	Sampler driven with 325 lbs. cable tool jars
	DM	10/12	7 16			OVA-0.2ppm
5						
				Medium dense, light brown, fine to medium grained, poorly graded SAND	SP	
	DM	12/12	4 15			OVA-0.4ppm
10						
	DM	12/12	12 12			OVA-0.6ppm
15						
	DM	12/12	8 10			OVA-Background
20						
	DM	12/12	13 17	Becoming dense, medium grained and gray		OVA-0.8ppm
25						

WOODWARD-CLYDE CONSULTANTS

FIGURE NO. B-3

BORING LOG

SHEET 2 OF 2

PROJECT NAME COMMENCEMENT BAY

PROJECT NO. K81-4521

DATE 10-13-82

CBS-02

PROJECT LOCATION Tacoma, Washington

RIG Mobile B-61

LOGGED BY G. Hess DRILLED BY S. Sterling

WATER ENTERS El. 214 ATD

SURFACE ELEVATION 240 ELEVATION DATUM USC & GS

DEPTH	SAMPLE TYPE	REC	RESIST	DESCRIPTION	U.S.C.	SPECIAL NOTES AND FIELD OBSERVATIONS
25				SAME: Dense, gray, medium grained, poorly graded SAND	SP	Water detected ATD
	DM	12/12	10 10			OVA-4.2ppm
30						
	DM	12/12	5 15			OVA-0.6ppm
						Bottom of boring 33.0'
35						

WOODWARD-CLYDE CONSULTANTS

FIGURE NO. B-4

BORING LOG

SHEET 1 OF 2

PROJECT NAME COMMENCEMENT BAY

PROJECT NO. K81-4521

DATE 10-9-82

CBS-03

PROJECT LOCATION Tacoma, Washington

RIG Mobile B-61

LOGGED BY G. Hess DRILLED BY S. Sterling

WATER ENTERS El. 212 ATD

SURFACE ELEVATION 249 ELEVATION DATUM USC & GS

DEPTH	SAMPLE TYPE	SAMPLE REC	SAMPLE RESIST	DESCRIPTION	U.S.C.	SPECIAL NOTES AND FIELD OBSERVATIONS
0				Firm, light brown, low plastic Silty CLAY with some gravel and trace of sand	CL	Boring advanced with 10" diameter hollow-stem augers with 11" diameter bit Sampler driven with 325 lbs. cable tool jars
	DM	0/10	17 10	Medium dense, light brown, fine to medium grained, poorly graded GRAVEL with sand and silt	GP	
5						
	DM	0/12	6 12			
10						
				Dense, light brown-gray, medium to coarse grained, poorly graded SAND with some fine to medium gravel	SP	
	DM	18/18	12 18 18			OVA-Background
15						
	DM	2/12	10 18			OVA-0.2ppm
20				Dense, light brown, medium grained, poorly graded SAND		
	DM	18/18	10 18 22			OVA-0.4ppm
25						

BORING LOG

SHEET 2 OF 2

PROJECT NAME COMMENCEMENT BAY

PROJECT NO. K81-4521

DATE 10-4-82

CBS-03

PROJECT LOCATION Tacoma, Washington

RIG Mobile B-61

LOGGED BY G. Hess DRILLED BY S. Sterling

WATER ENTERS El. 212 ATD

SURFACE ELEVATION 249 ELEVATION DATUM USC & GS

DEPTH	SAMPLE TYPE	SAMPLE REC	SAMPLE RESIST	DESCRIPTION	U.S.C.	SPECIAL NOTES AND FIELD OBSERVATIONS
25				Medium dense, light brown, medium to fine grained, poorly graded SAND	SP	
	DM	12/12	7 11			OVA-0.5ppm
30						
	DM	12/12	7 8			OVA-0.3ppm
35						
						← Water detected ATD
	DM	12/12	8 10			OVA-0.3ppm
40						
				Becoming dense		
	DM	10/12	12 20			OVA-Background
						Bottom of boring 44.0'
45						

WOODWARD-CLYDE CONSULTANTS

FIGURE NO. B-6

BORING LOG

SHEET 1 OF 2

PROJECT NAME COMMENCEMENT BAY

PROJECT NO. K81-4521

DATE 10-11-82

CBS-04

PROJECT LOCATION Tacoma, Washington

RIG Mobile B-61

LOGGED BY G. Hess

DRILLED BY S. Sterling

WATER ENTERS El. 213 ATD

SURFACE ELEVATION 251

ELEVATION DATUM USC & GS

DEPTH	SAMPLE TYPE	SAMPLE REC	SAMPLE RESIST	DESCRIPTION	U.S.C.	SPECIAL NOTES AND FIELD OBSERVATIONS
0				Firm, dark brown-olive, low plastic Silty CLAY with some fine sand to Silty Sand	CL | .SM	Boring advanced with 10" diameter hollow-stem augers with 11" diameter bit. Sampler driven with 325 lbs. cable tool jars
	DM	12/12	4 9	Medium dense, brown, fine to medium grained, poorly graded SAND with trace of silt and fine to medium gravel	SP	OVA-0.4ppm
5						
	DM	12/12	5 7			OVA-0.4ppm
10				With less silt and gravel		
	DM	12/12	5 8			OVA-Background
15				Increasing fine gravel content		
	DM	12/12	7 16	With some fine gravel		OVA-1.0ppm
20				Gravel content decreasing		
	DM	12/12	15 35	Becoming dense		OVA-0.8ppm
25						

WOODWARD-CLYDE CONSULTANTS

FIGURE NO. B-7

BORING LOG

SHEET 2 OF 2

PROJECT NAME COMMENCEMENT BAY

PROJECT NO. K81-4521

DATE 10-11-82

CBS-04

PROJECT LOCATION Tacoma, Washington

RIG Mobile B-61

LOGGED BY G. Hess DRILLED BY S. Sterling

WATER ENTERS El. 213 ATD

SURFACE ELEVATION 251 ELEVATION DATUM USC & GS

DEPTH	SAMPLE TYPE	SAMPLE REC	SAMPLE RESIST	DESCRIPTION	U.S.C.	SPECIAL NOTES AND FIELD OBSERVATIONS
25				SAME: Dense, brown, fine to medium grained, poorly graded SAND with trace of silt and gravel	SP	
	DM	12/12	13 25			OVA-0.6ppm
30						
	DM	12/12	12 27			OVA-0.85ppm
35						
						Water detected ATD
	DM	12/12	10 10			OVA-2.2ppm
40						
	DM	6/6	30			OVA-0.2ppm
						Bottom of boring 43.5'
45						

WOODWARD-CLYDE CONSULTANTS

FIGURE NO. B-8

BORING LOG

SHEET 1 OF 2

PROJECT NAME COMMENCEMENT BAY

PROJECT NO. K81-4521

DATE 10-12-82

RIG Mobile B-61

WATER ENTERS El. 219 ATD

CBS-10

PROJECT LOCATION Tacoma, Washington

LOGGED BY G. Hess DRILLED BY S. Sterling

SURFACE ELEVATION 255 ELEVATION DATUM USC & GS

DEPTH	SAMPLE TYPE	SAMPLE REC	SAMPLE RESIST	DESCRIPTION	U.S.C.	SPECIAL NOTES AND FIELD OBSERVATIONS
0				Medium dense, dark brown, fine grained, poorly graded Silty SAND with some fine gravel and organics	SM	Boring advanced with 10" diameter hollow-stem augers with 11" diameter bit. Sampler driven with 325 lbs. cable tool-jars
	DM	9/12	3 11			OVA-1.0ppm
5				Dense, brown, medium grained, poorly graded SAND with some fine to medium gravel	SP	
	DM	6/6	28			OVA-1.6ppm
10				With trace of coarse gravel		
	DM	12/12	20 15			OVA-0.2ppm
15				Medium dense, light brown, fine grained, poorly graded SAND with trace of silt and clay		
	DM	12/12	9 12			OVA-0.2ppm
20						
	DM	12/12	6 14			OVA-2.2ppm
25						

BORING LOG

SHEET 2 OF 2

PROJECT NAME COMMENCEMENT BAY

PROJECT NO. K81-4521

DATE 10-12-82

CBS-10

PROJECT LOCATION Tacoma, Washington

RIG Mobile B-61

LOGGED BY G. Hess DRILLED BY S. Sterling

WATER ENTERS El. 219 ATD

SURFACE ELEVATION 255 ELEVATION DATUM USC & GS

DEPTH	SAMPLE TYPE	SAMPLE REC	SAMPLE RESIST	DESCRIPTION	U.S.C.	SPECIAL NOTES AND FIELD OBSERVATIONS
25				SAME: Medium dense, light brown, fine grained, poorly graded SAND with trace of silt and clay	SP	
	DM	12/12	9 16			OVA-0.6ppm
30						
				Becoming dense		
	DM	12/12	7 22			OVA-0.4ppm
35						
						Water detected ATD
	DM	12/12	8 23			OVA-7.8ppm
40						
				Becoming medium dense		
	DM	12/12	4 11			OVA-3.4ppm
						Bottom of boring 44.0'
45						

BORING LOG

SHEET 1 OF 2

PROJECT NAME COMMENCEMENT BAY

PROJECT NO. K81-4521

DATE 10-14-82

CBS-11

PROJECT LOCATION Tacoma, Washington

RIG Mobile B-61

LOGGED BY G. Hess DRILLED BY S. Sterling

WATER ENTERS El. 217 ATD

SURFACE ELEVATION 254 ELEVATION DATUM USC & GS

DEPTH	SAMPLE TYPE	SAMPLE REC	SAMPLE RESIST	DESCRIPTION	U.S.C.	SPECIAL NOTES AND FIELD OBSERVATIONS
0				Loose, dark brown-black, fine grained, poorly graded Silty SAND FILL with trace of fine to medium gravel	FILL	Boring advanced with 10" diameter hollow stem augers with 11" diameter bit. Sampler driven with 325 lbs. cable tool jars
	DM	4/12	3 2			OVA-0.8ppm
5						
	DM	6/18	1 2 1			OVA-0.5ppm
10						
				Medium dense, light brown, medium grained, poorly graded SAND with trace of fine to medium gravel	SP	
	DM	10/12	6 9			OVA-3.1ppm
15						
	DM	10/12	6 9			OVA-7.5ppm
20						
				Gravel content decreasing		
				Becoming dense		
	DM	6/12	12 25			OVA-5.1ppm
25						

WOODWARD-CLYDE CONSULTANTS

FIGURE NO. B-20

BORING LOG

SHEET 2 OF 2

PROJECT NAME COMMENCEMENT BAY

PROJECT NO. K81-4521

DATE 10-14-82

CBS-11

PROJECT LOCATION Tacoma, Washington

RIG Mobile B-61

LOGGED BY G. Hess DRILLED BY S. Sterling

WATER ENTERS El. 217 ATD

SURFACE ELEVATION 254 ELEVATION DATUM USC & GS

DEPTH	SAMPLE TYPE	SAMPLE REC	SAMPLE RESIST	DESCRIPTION	U.S.C.	SPECIAL NOTES AND FIELD OBSERVATIONS
25				SAME: Medium dense, light brown, medium grained, poorly graded SAND with trace of fine to medium gravel	SP	
				Medium dense, light brown, fine grained, poorly graded SAND		
	DM	10/12	14 14			OVA-0.8ppm
30				Becoming light brown		
	DM	10/12	19 23			OVA-1.9ppm
35						
				Medium dense, gray-brown, medium grained, poorly graded SAND		Water detected ATD
	DM	12/12	21 25			OVA-2.8ppm
40						
	DM	12/12	4 8			OVA-1.8ppm
						Bottom of boring 44.0'
45						

WOODWARD-CLYDE CONSULTANTS

FIGURE NO. B-21

BORING LOG

SHEET 1 OF 2

PROJECT NAME COMMENCEMENT BAY

PROJECT NO. K81-4521

DATE 10-13-82

RIG Mobile B-61

WATER ENTERS El. 212 ATD

CBS-12

PROJECT LOCATION Tacoma, Washington

LOGGED BY G. Hess DRILLED BY S. Sterling

SURFACE ELEVATION 238 ELEVATION DATUM USC & GS

DEPTH	SAMPLE TYPE	SAMPLE REC	SAMPLE RESIST	DESCRIPTION	U.S.C.	SPECIAL NOTES AND FIELD OBSERVATIONS
0				Medium dense, dark brown, fine grained, poorly graded SAND and silt, with some clay and trace of gravel	SP-SM	Boring advanced with 10" diameter hollow stem augers with 11" diameter bit
				Loose, light brown, fine to medium grained, poorly graded SAND with some fine to medium gravel	SP	Sampler driven with 325 lbs. cable tool jars
	DM	6/12	3 2			OVA-1.2ppm
5						
	DM	10/12	4 4			OVA-Background
10						
				Becoming medium grained		
	DM	8/12	2 2			OVA-0.6ppm
15				Becoming fine to medium grained		
	DM	12/12	6 10			OVA-0.2ppm
20						
	DM	12/12	8 15	Becoming medium dense with trace of coarse sand and gravel		OVA-0.6ppm
25						

WOODWARD-CLYDE CONSULTANTS

FIGURE NO. B-22

BORING LOG

SHEET 2 OF 2

PROJECT NAME COMMENCEMENT BAY

PROJECT NO. K81-4521

DATE 10-13-82

CBS-12

PROJECT LOCATION Tacoma, Washington

RIG Mobile B-61

LOGGED BY G. Hess DRILLED BY S. Sterling

WATER ENTERS El. 212 ATD

SURFACE ELEVATION 238 ELEVATION DATUM USC & GS

DEPTH	SAMPLE TYPE	SAMPLE REC	SAMPLE RESIST	DESCRIPTION	U.S.C.	SPECIAL NOTES AND FIELD OBSERVATIONS
25				SAME: Medium dense, light brown, fine to medium grained, poorly graded SAND with some gravel	SP	Water detected ATD
	DM	10/12	8 30			OVA-4.0ppm
30						
	DM	6/12	7 15			OVA-Background
35						Bottom of boring 34.0'

WOODWARD-CLYDE CONSULTANTS

FIGURE NO. B-23

BORING LOG

SHEET 1 OF 4

PROJECT NAME COMMENCEMENT BAY

PROJECT NO. K81-4521

DATE 11-4-82

CBS-13

PROJECT LOCATION Tacoma, Washington

RIG Speedstar SS15

LOGGED BY M. Doolan DRILLED BY R. Ostgoodby

WATER ENTERS El. 224 ATD

SURFACE ELEVATION 233 ELEVATION DATUM USC & GS

DEPTH	SAMPLE TYPE	SAMPLE REC	SAMPLE RESIST	DESCRIPTION	U.S.C.	SPECIAL NOTES AND FIELD OBSERVATIONS
0				Dense, brown, poorly graded, medium grained Gravelly SAND with some silt and trace of clay	SP	Boring advanced with air rotary rig, using 7 7/8" tricone roller bit Sampler driven with 350 lbs. cable tool jars
5				Dense, brown, poorly graded, medium Sandy GRAVEL with some silt and trace of clay	GP	
				Loose to medium dense, brown-gray, poorly graded, medium to coarse grained Gravelly SAND with some silt and trace of clay	SP	Water detected ATD
10	DM	12/12	9			OVA-2.0ppm Boring continued with 5 7/8" tricone roller bit with air and 6" diameter welded steel casing with top drive casing hammer
15				Becoming dense		
				With occasional layers of dense, gray, Sandy SILT with trace of clay and gravel	W/ ML	
	DM	12/12	50	Gravel content decreasing		OVA 5.0ppm
20						
25						

WOODWARD-CLYDE CONSULTANTS

FIGURE NO. B-24

BORING LOG

SHEET 2 OF 4

PROJECT NAME COMMENCEMENT BAY

PROJECT NO. K81-4521

DATE 11-4-82

CBS-13

PROJECT LOCATION Tacoma, Washington

RIG Speedstar SS15

LOGGED BY M. Doolan DRILLED BY R. Ostgoodby

WATER ENTERS El. 224 ATD

SURFACE ELEVATION 233 ELEVATION DATUM USC & GS

DEPTH	SAMPLE TYPE	SAMPLE REC	SAMPLE RESIST	DESCRIPTION	U.S.C.	SPECIAL NOTES AND FIELD OBSERVATIONS
25				SAME: Dense, gray, poorly graded, medium grained SAND with some medium to coarse gravel and trace of silt and clay	SP	
	DM	12/12	37			OVA-0.6ppm
30						
				Becoming more gravelly with fine to medium gravel		
35						
	DM	0/12	75			
40						
				With layers of dense, brown-gray, poorly graded, Sandy GRAVEL	W/ GP	
45						
				Very dense, brown-gray, poorly graded, medium to coarse grained GRAVEL with some sand and trace of silt	GP	
	DM	8/12	120			OVA-4.0ppm
50						

BORING LOG

SHEET 3 OF 4

PROJECT NAME COMMENCEMENT BAY

PROJECT NO. K81-4521

DATE 11-5-82

CBS-13

PROJECT LOCATION Tacoma, Washington

RIG Speedstar SS15

LOGGED BY M. Doolan DRILLED BY R. Ostgoodby

WATER ENTERS El. 224 ATD

SURFACE ELEVATION 233 ELEVATION DATUM USC & GS

DEPTH	SAMPLE TYPE	SAMPLE REC	SAMPLE RESIST	DESCRIPTION	U.S.C.	SPECIAL NOTES AND FIELD OBSERVATIONS
50				SAME: Very dense, brown-gray, poorly graded, medium to coarse grained GRAVEL with some sand and trace of silt With dense, gray, medium sand lenses	GP W/ SP	
55				Increasing coarse sand content		
	DM	12/12	120			OVA-4.4ppm
60						
				Very dense, gray-brown, medium grained SAND with some medium gravel and trace of silt	SP	
65				Very dense, gray-brown, fine to medium grained Sandy GRAVEL with some silt	GP	
				Becoming coarse		
	DM	4/12	50			OVA-0.6ppm
70						
75						

BORING LOG

SHEET 4 OF 4

PROJECT NAME COMMENCEMENT BAY

PROJECT NO. K81-4521

CBS-13

DATE 11-5-82

PROJECT LOCATION Tacoma, Washington

RIG Speedstar SS15

LOGGED BY M. Doolan DRILLED BY R. Ostgoodby

WATER ENTERS El. 224 ATD

SURFACE ELEVATION 233 ELEVATION DATUM USC & GS

DEPTH	SAMPLE TYPE	SAMPLE REC	SAMPLE RESIST	DESCRIPTION	U.S.C.	SPECIAL NOTES AND FIELD OBSERVATIONS
75				SAME: Very dense, gray-brown, fine to medium grained Sandy GRAVEL with some silt	GP	
				Silt content increasing	GP-GM	
	DM	8/12	30			OVA-4.6ppm
80						
				Dense, gray-brown, highly plastic Clayey with sand and trace of gravel	MH	
85				Dense, brown-gray, poorly graded, Silty SAND with some gravel	SM	
	DM	12/12	67			OVA-2.0ppm
90						
95						
	DM	12/12	72			OVA-0.8ppm
						Bottom of boring 99.0'
100						

APPENDIX C

WELL INSTALLATION REPORTS

SOUTH TACOMA SWAMP

PRELIMINARY SITE INVESTIGATION

PIEZOMETER INSTALLATION REPORT

Piezometer No. CBS-01

Project COMMENCEMENT BAY

Location Tacoma, Wa.

Project No. K81-4521 Installed By M. Geroud

Date 10-11-82 Time 1550

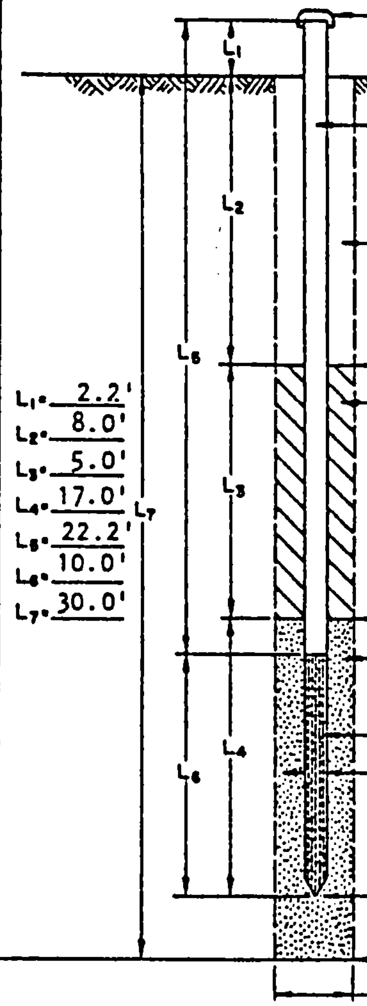
Method of Installation See Boring Log CBS-01 for details.

LOG OF BORING AND PIEZOMETER

BORING			PIEZOMETER
Depth in ft.	Description	Symbol	Type of Piezometer Monitoring Well
	See Boring Log CBS-01 for detailed description		

Ground Elev. 238.6

Top of Steel Riser Elev. 240.81



Vented Cap

I.D. of Riser Pipe 2 in.

Type of Pipe PVC Sched. 40

Type of Backfill Around Riser Cement-Bentonite Grout

Top of Seal Elev. 230.6

Type of Seal Material Bentonite Slurry

Top of Filter Elev. 225.6

Type of Filter Material Traction Sand

Size of Openings 0.010 in.

Diameter of Piezometer Tip 2 in. I.D.

Bottom of Piez. Elev. 208.6

Bottom of Boring Elev. 208.6

Diameter of Boring 11 in.

Remarks Protective casing stick-up 2.2'

Inspected By M. Geroud

WOODWARD-CLYDE CONSULTANTS

PIEZOMETER INSTALLATION REPORT

Piezometer No. CBS-02

Project COMMENCEMENT BAY

Location Tacoma, Wa.

Project No. K81-4521 Installed By G. Hess

Date 10-13-82 Time 1120

Method of Installation See Boring Log CBS-02 for details.

LOG OF BORING AND PIEZOMETER

BORING

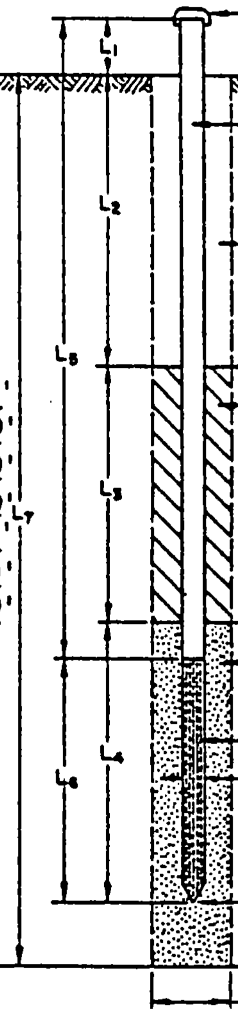
Depth in ft.	Description	Symbol
	See Boring Log CBS-02 for detailed description	

PIEZOMETER

Type of Piezometer Monitoring Well

Ground Elev. 240.3

Top of Steel Riser Elev. 241.78



Vented Cap

I.D. of Riser Pipe 2 in.

Type of Pipe PVC Sched. 40

Type of Backfill Around Riser Cement-Bentonite Grout

Top of Seal Elev. 220.3

Type of Seal Material Bentonite Slurry

Top of Filter Elev. 214.3

Type of Filter Material Traction Sand

Size of Openings 0.010 in.

Diameter of Piezometer Tip 2 in. I.D.

Bottom of Piez. Elev. 207.3

Bottom of Boring Elev. 207.3

Diameter of Boring 11 in.

L_1 = 1.5'
L_2 = 20.0'
L_3 = 6.0'
L_4 = 7.0'
L_5 = 29.5'
L_6 = 5.0'
L_7 = 33.0'

Remarks Protective casing stick-up 1.5'.

Inspected By G. Hess

PIEZOMETER INSTALLATION REPORT

Piezometer No. CBS-03

Project COMMENCEMENT BAY

Location Tacoma, Wa.

Project No. K81-4521 Installed By G. Hess

Date 10-10-82 Time 1130

Method of Installation See Boring Log CBS-03 for details.

LOG OF BORING AND PIEZOMETER

BORING

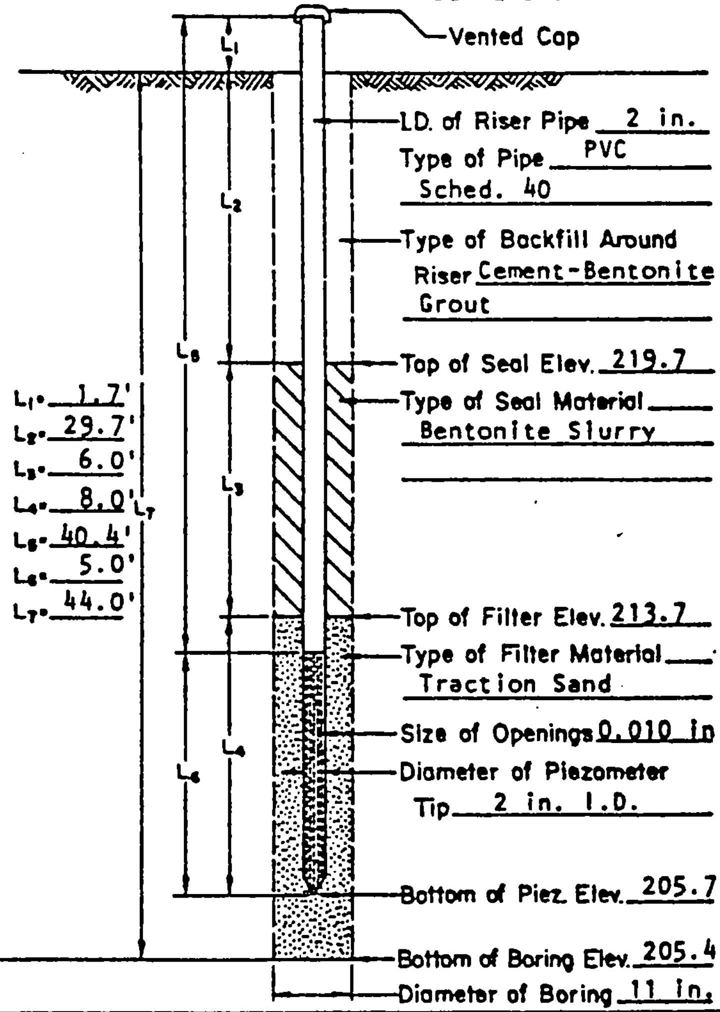
Depth in ft.	Description	Symbol
	See Boring Log CBS-03 for detailed description	

PIEZOMETER

Type of Piezometer Monitoring Well

Ground Elev. 249.4

Top of Steel Riser Elev. 251.14



Remarks Protective casing stick-up 1.75'.

Inspected By G. Hess

WOODWARD - CLYDE CONSULTANTS

PIEZOMETER INSTALLATION REPORT

Project: COMMENCEMENT BAY

Project No. K81-4521 Installed By: G. Hess

Piezometer No.: CBS-04

Location: Tacoma, Wa.

Date: 10-11-82 Time: 1330

Method of Installation: See Boring Log CBS-04 for details.

LOG OF BORING AND PIEZOMETER

BORING

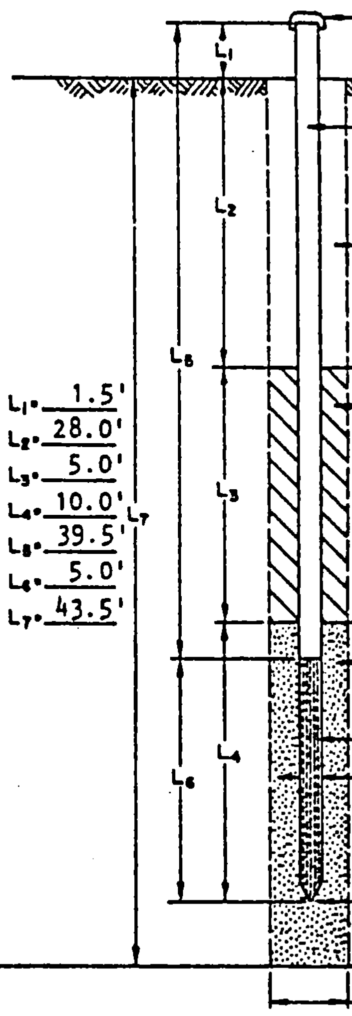
Depth in ft.	Description	Symbol
	See Boring Log CBS-04 for detailed description	

PIEZOMETER

Type of Piezometer: Monitoring Well

Ground Elev. 250.8

Top of Steel Riser Elev. 252.30



- Vented Cap
- I.D. of Riser Pipe: 2 in.
- Type of Pipe: PVC Sched. 40
- Type of Backfill Around Riser: Cement-Bentonite Grout
- Top of Seal Elev. 222.8
- Type of Seal Material: Bentonite Slurry
- Top of Filter Elev. 217.8
- Type of Filter Material: Traction Sand
- Size of Openings: 0.010 in.
- Diameter of Piezometer Tip: 2 in. I.D.
- Bottom of Piez. Elev. 207.8
- Bottom of Boring Elev. 207.3
- Diameter of Boring: 11 in.

L_1 = 1.5'
L_2 = 28.0'
L_3 = 5.0'
L_4 = 10.0'
L_5 = 39.5'
L_6 = 5.0'
L_7 = 43.5'

Remarks: Protective casing stick-up 1.5'.

C-4 Inspected By: G. Hess

WOODWARD – CLYDE CONSULTANTS

PIEZOMETER INSTALLATION REPORT

Project COMMENCEMENT BAY

Project No. K81-4521 Installed By G. Hess

Piezometer No. CBS-05

Location Tacoma, Wa.

Date 10-11-82 Time 1300

Method of Installation See Boring Log CBS-05 for details.

LOG OF BORING AND PIEZOMETER

BORING

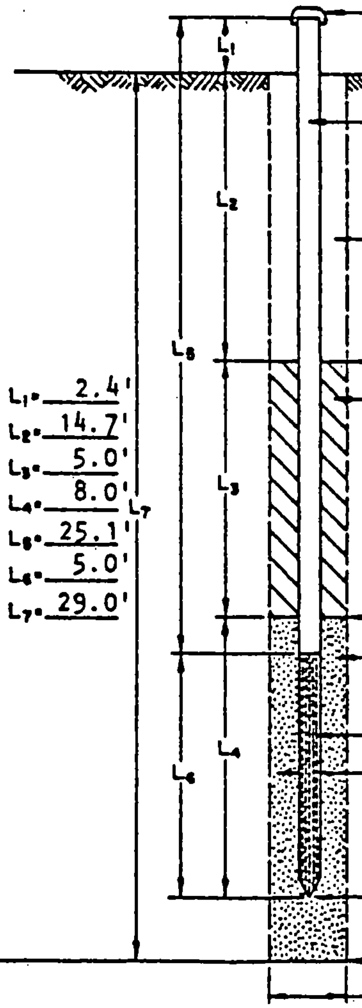
Depth in ft.	Description	Symbol
	See Boring Log CBS-05 for detailed description	

PIEZOMETER

Type of Piezometer Monitoring Well

Ground Elev. 236.9

Top of Steel Riser Elev. 239.28



L1 = 2.4'
L2 = 14.7'
L3 = 5.0'
L4 = 8.0'
L5 = 25.1'
L6 = 5.0'
L7 = 29.0'

Vented Cap

I.D. of Riser Pipe 2 in.

Type of Pipe PVC Sched. 40

Type of Backfill Around Riser Cement-Bentonite Grout

Top of Seal Elev. 222.2

Type of Seal Material Bentonite Slurry

Top of Filter Elev. 217.2

Type of Filter Material Traction Sand

Size of Openings 0.010 in.

Diameter of Piezometer Tip 2 in. I.D.

Bottom of Piez. Elev. 209.2

Bottom of Boring Elev. 207.9

Diameter of Boring 11 in.

Remarks Protective casing stick-up 2.4'.

C-5 Inspected By G. Hess

WOODWARD - CLYDE CONSULTANTS

PIEZOMETER INSTALLATION REPORT

Project COMMENCEMENT BAY

Project No. K81-4521 Installed By G. Hess

Piezometer No. CBS-06

Location Tacoma, Wa.

Date 10-12-82 Time 1600

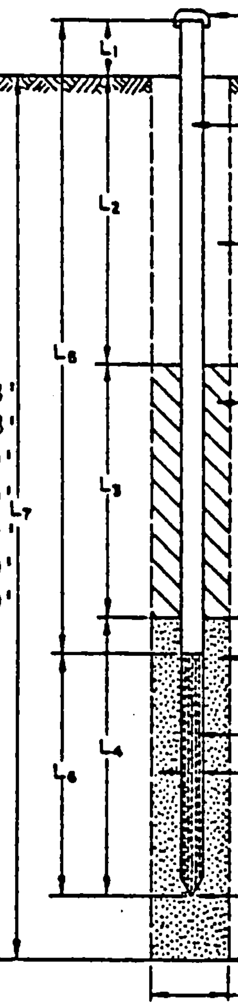
Method of Installation See Boring Log CBS-06 for details.

LOG OF BORING AND PIEZOMETER

BORING			PIEZOMETER
Depth in ft.	Description	Symbol	Type of Piezometer Monitoring Well
	See Boring Log CBS-06 for detailed description		

Ground Elev. 233.1

Top of Steel Riser Elev. 234.37



Vented Cap

I.D. of Riser Pipe 2 in.

Type of Pipe PVC Sched. 40

Type of Backfill Around Riser Cement-Bentonite Grout

Top of Seal Elev. 221.3

Type of Seal Material Bentonite Slurry

Top of Filter Elev. 216.3

Type of Filter Material Traction Sand

Size of Openings 0.010 in.

Diameter of Piezometer Tip 2 in. I.D.

Bottom of Piez. Elev. 205.3

Bottom of Boring Elev. 205.1

Diameter of Boring 11 in.

L_1 = 1.3'

L_2 = 11.8'

L_3 = 5.0'

L_4 = 11.0'

L_5 = 24.1'

L_6 = 5.0'

L_7 = 28.0'

Remarks Protective casing stick-up 1.3'.

C-6 Inspected By G. Hess

WOODWARD-CLYDE CONSULTANTS

PIEZOMETER INSTALLATION REPORT

Piezometer No. CBS-07

Project COMMENCEMENT BAY

Location Tacoma, Wa.

Project No. K81-4521 Installed By M. Geroud

Date 10-12-82 Time 1400

Method of Installation See Boring Log CBS-07 for details.

LOG OF BORING AND PIEZOMETER

BORING

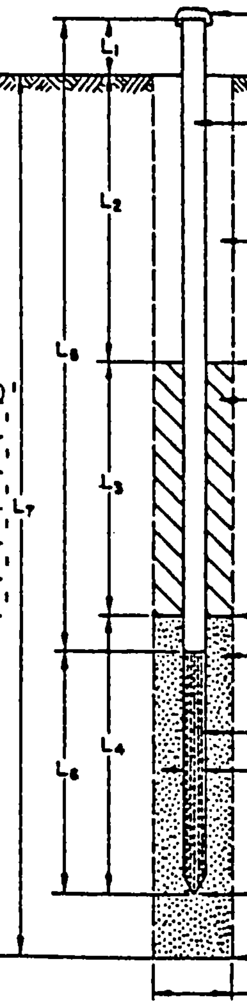
Depth in ft.	Description	Symbol
	See Boring Log CBS-07 for detailed description	

PIEZOMETER

Type of Piezometer Monitoring Well

Ground Elev. 254.4

Top of Steel Riser Elev. 255.40



- Vented Cap
- I.D. of Riser Pipe 2 in.
- Type of Pipe PVC Sched. 40
- Type of Backfill Around Riser Cement-Bentonite Grout
- Top of Seal Elev. 219.4
- Type of Seal Material Bentonite Slurry
- Top of Filter Elev. 213.4
- Type of Filter Material Traction Sand
- Size of Openings 0.010 in
- Diameter of Piezometer Tip 2 in. I.D.
- Bottom of Piez. Elev. 206.4
- Bottom of Boring Elev. 206.4
- Diameter of Boring 11 in.

L_1 = 1.0'
L_2 = 35.0'
L_3 = 6.0'
L_4 = 7.0'
L_5 = 44.0'
L_6 = 5.0'
L_7 = 48.0'

Remarks Protective casing stick-up .95'

 Inspected By M. Geroud

WOODWARD-CLYDE CONSULTANTS

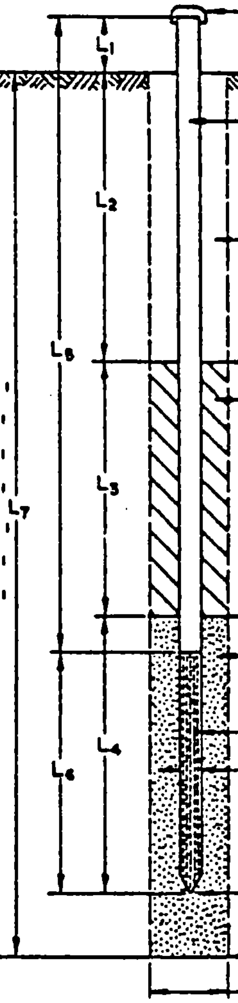
PIEZOMETER INSTALLATION REPORT

Piezometer No. CBS-08
Project COMMENCEMENT BAY
Location Tacoma, Wa.
Project No. K81-4521 Installed By M. Geroud
Date 10-13-82 Time 1630
Method of Installation See Boring Log CBS-08 for details.

LOG OF BORING AND PIEZOMETER

BORING			PIEZOMETER
Depth in ft.	Description	Symbol	Type of Piezometer Monitoring Well
	See Boring Log CBS-08 for detailed description		

Ground Elev. 224.0
Top of Steel Riser Elev. 226.44



Vented Cap
I.D. of Riser Pipe 2 in.
Type of Pipe PVC Sched. 40
Type of Backfill Around Riser Cement-Bentonite Grout
Top of Seal Elev. 219.0
Type of Seal Material Bentonite Slurry
Top of Filter Elev. 213.0
Type of Filter Material Traction Sand
Size of Openings 0.010 in.
Diameter of Piezometer Tip 2 in. I.D.
Bottom of Piez. Elev. 206.0
Bottom of Boring Elev. 206.0
Diameter of Boring 11 in.

L_1 = 2.4'
L_2 = 5.0'
L_3 = 6.0'
L_4 = 7.0'
L_5 = 15.4'
L_6 = 5.0'
L_7 = 18.0'

Remarks Protective casing stick-up 2.4'.

 Inspected By M. Geroud

WOODWARD – CLYDE CONSULTANTS

PIEZOMETER INSTALLATION REPORT

Piezometer No. CBS-09

Project COMMENCEMENT BAY

Location Tacoma, Wa.

Project No. K81-4521 Installed By G. Hess

Date 10-11-82 Time 1600

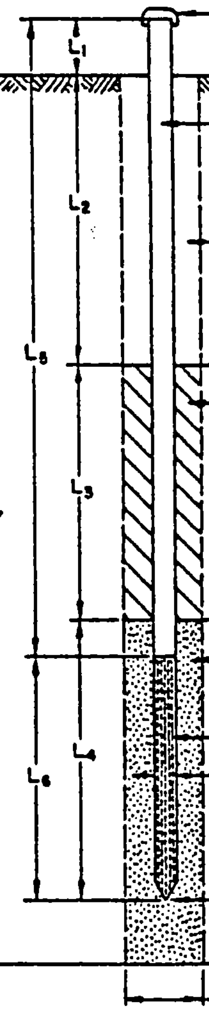
Method of Installation See Boring Log CBS-09 for details.

LOG OF BORING AND PIEZOMETER

BORING			PIEZOMETER
Depth in ft.	Description	Symbol	Type of Piezometer Monitoring Well
	See Boring Log CBS-09 for detailed description		

Ground Elev. 242.3

Top of Steel Riser Elev. 243.88



L1 = 1.6'
L2 = 20.5'
L3 = 5.0'
L4 = 8.0'
L5 = 30.1'
L6 = 5.0'
L7 = 34.0'

I.D. of Riser Pipe 2 in.

Type of Pipe PVC Sched. 40

Type of Backfill Around Riser Cement-Bentonite Grout

Top of Seal Elev. 221.8

Type of Seal Material Bentonite Slurry

Top of Filter Elev. 216.8

Type of Filter Material Traction Sand

Size of Openings 0.010 in

Diameter of Piezometer Tip 2 in. I.D.

Bottom of Piez. Elev. 208.8

Bottom of Boring Elev. 208.3

Diameter of Boring 11 in.

Remarks Protective casing stick-up 1.6'.

 Inspected By G. Hess

WOODWARD-CLYDE CONSULTANTS

PIEZOMETER INSTALLATION REPORT

Project: COMMENCEMENT BAY
Piezometer No.: CBS-10
Location: Tacoma, Wa.
Project No.: K81-4521 Installed By: G. Hess
Date: 10-12-82 Time: 1045
Method of Installation: See Boring Log CBS-10 for details.

LOG OF BORING AND PIEZOMETER

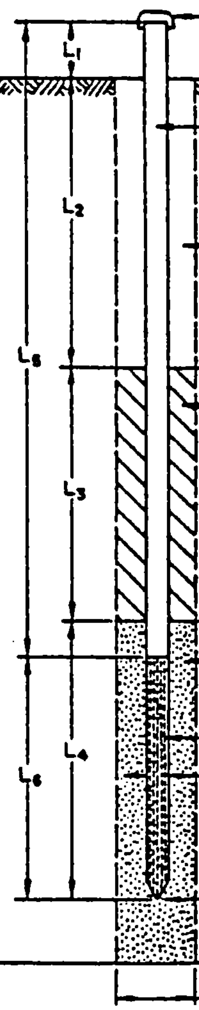
BORING

Depth in ft.	Description	Symbol
	See Boring Log CBS-10 for detailed description	

PIEZOMETER

Type of Piezometer: Monitoring Well

Ground Elev.: 255.2
Top of Steel Riser Elev.: 256.45



Vented Cap

I.D. of Riser Pipe: 2 in.
Type of Pipe: PVC Sched. 40
Type of Backfill Around Riser: Cement-Bentonite Grout
Top of Seal Elev.: 225.2
Type of Seal Material: Bentonite Slurry
Top of Filter Elev.: 220.2
Type of Filter Material: Traction Sand
Size of Openings: 0.010 in.
Diameter of Piezometer Tip: 2 in. I.D.
Bottom of Piez. Elev.: 211.4
Bottom of Boring Elev.: 211.2
Diameter of Boring: 11 in.

L_1 = 1.3'
L_2 = 30.0'
L_3 = 5.0'
L_4 = 8.8'
L_5 = 40.1'
L_6 = 5.0'
L_7 = 44.0'

Remarks: Protective casing stick-up 1.3'.

C-10 Inspected By: G. Hess

WOODWARD—CLYDE CONSULTANTS

PIEZOMETER INSTALLATION REPORT

Piezometer No. CBS-11

Project COMMENCEMENT BAY

Location Tacoma, Wa.

Project No. K81-4521 Installed By G. Hess

Date 10-14-82 Time 1000

Method of Installation See Boring Log CBS-11 for details.

LOG OF BORING AND PIEZOMETER

BORING

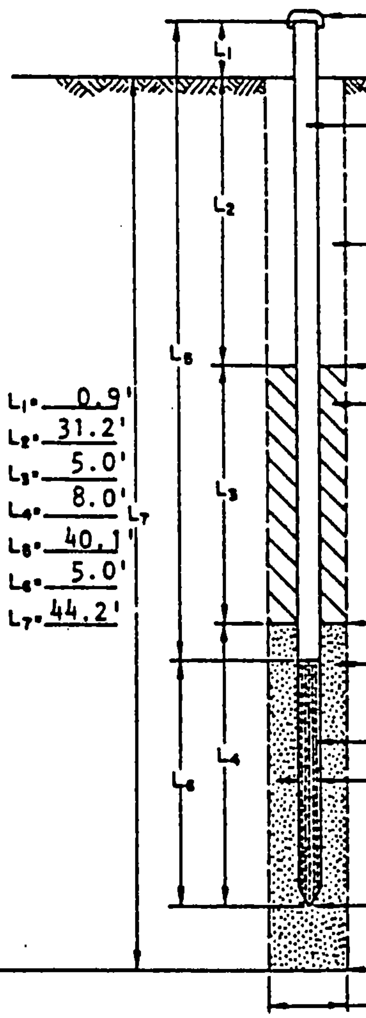
Depth in ft.	Description	Symbol
	See Boring Log CBS-11 for detailed description	

PIEZOMETER

Type of Piezometer Monitoring Well

Ground Elev. 253.8

Top of Steel Riser Elev. 254.68



Vented Cap

I.D. of Riser Pipe 2 in.

Type of Pipe PVC Sched. 40

Type of Backfill Around Riser Cement-Bentonite Grout

Top of Seal Elev. 222.6

Type of Seal Material Bentonite Slurry

Top of Filter Elev. 217.6

Type of Filter Material Traction Sand

Size of Openings 0.010 in

Diameter of Piezometer Tip 2 in. I.D.

Bottom of Piez. Elev. 209.6

Bottom of Boring Elev. 209.6

Diameter of Boring 11 in.

L_1 = 0.9'
L_2 = 31.2'
L_3 = 5.0'
L_4 = 8.0'
L_5 = 40.1'
L_6 = 5.0'
L_7 = 44.2'

Remarks Protective casing stick-up 0.9'.

C-11 Inspected By G. Hess

WOODWARD-CLYDE CONSULTANTS

PIEZOMETER INSTALLATION REPORT

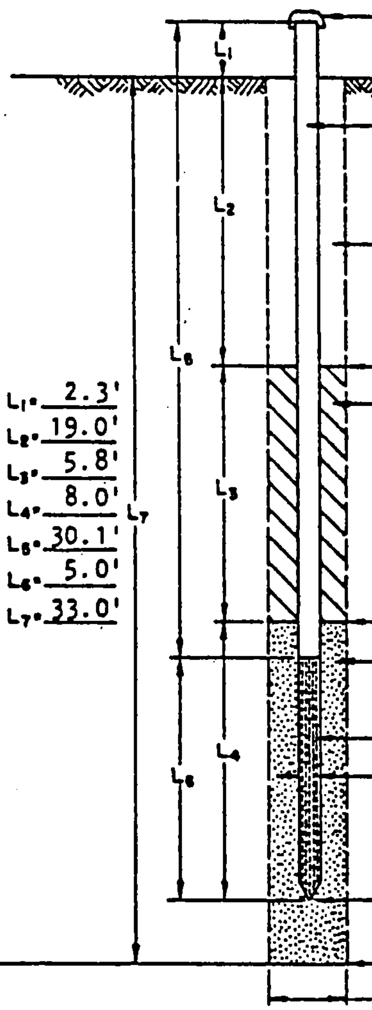
Piezometer No. CBS-12
Project COMMENCEMENT BAY
Location Tacoma, Wa.
Project No. K81-4521 Installed By G. Hess
Date 10-13-82 Time 1315

Method of Installation See Boring Log CBS-12 for details.

LOG OF BORING AND PIEZOMETER

BORING			PIEZOMETER
Depth in ft.	Description	Symbol	Type of Piezometer Monitoring Well
	See Boring Log CBS-12 for detailed description		

Ground Elev. 238.5
Top of Steel Riser Elev. 240.79



L1 = 2.3'
L2 = 19.0'
L3 = 5.8'
L4 = 8.0'
L5 = 30.1'
L6 = 5.0'
L7 = 33.0'

I.D. of Riser Pipe 2 in.
Type of Pipe PVC Sched. 40
Type of Backfill Around Riser Cement-Bentonite Grout
Top of Seal Elev. 219.5
Type of Seal Material Bentonite Slurry
Top of Filter Elev. 213.7
Type of Filter Material Traction Sand
Size of Openings 0.010 in
Diameter of Piezometer Tip 2 in. I.D.
Bottom of Piez. Elev. 205.7
Bottom of Boring Elev. 205.5
Diameter of Boring 11 in.

Remarks Protective casing stick-up 2.3'.

C-12 Inspected By G. Hess

WOODWARD - CLYDE CONSULTANTS

APPENDIX K

PLASMA SPECTROMETER ANALYSES - UNDATED

ICAP

PLASMA SPECTROMETER ANALYSIS

Samples 6826-A, 6826-B and 6826-C

	A Composite samples from Slag Wall	B Composite Samples from Foundry Pkg Lot	C Lump from Foundry Parking Lot
Aluminum	3.04	.14	.12
Antimony	< .0001	.21	< .0001
Arsenic	.004	.013	< .0001
Barium	2.28	.027	.048
Beryllium	< .0001	< .0001	< .0001
Bismuth	< .0001	< .0001	< .0001
Boron	< .0001	< .0001	< .0001
Cadmium	.0002	.0019	.0013
Calcium	6.47	.065	.033
Cerium	< .0001	< .0001	< .0001
Chromium	.0070	< .0001	< .0001
Cobalt	.0003	.0004	< .0001
Copper	.0007	3.65	.0046
Germanium	< .0001	< .0001	< .0001
Gold	< .0001	< .0001	< .0001
Iron	.98	1.19	.047
Lanthanum	.016	< .0001	.0056
Lead	.0088	13.67	.27
Lithium	.0035	< .0001	.0004
Magnesium	.21	.021	.0030
Manganese	1.58	.019	.0087
Molybdenum	< .0001	< .0001	< .0001
Niobium	< .0001	< .0001	< .0001
Neodymium	< .0001	< .0001	< .0001
Nickel	.0002	.019	.0003
Palladium	< .0001	< .0001	< .0001
Phosphorous	.011	< .0001	.70
Platinum	< .0001	< .0001	< .0001
Potassium	.24	.016	.0049
Rhodium	< .0001	< .0001	< .0001
Rubidium	< .0001	< .0001	< .0001
Scandium	< .0001	< .0001	< .0001
Silver	< .0001	< .0001	< .0001
Sodium	.16	.0086	.012
Strontium	.036	.0004	.0017
Tin	< .0001	1.58	< .0001
Titanium	.12	.0065	.0039
Thorium	< .0001	< .0001	< .0001
Tungsten	< .0001	< .0001	< .0001
Uranium	< .0001	< .0001	< .0001
Vanadium	.0072	.0043	.0005
Yttrium	< .0001	< .0001	< .0001
Zinc	.0005	3.15	.011
Zirconium	.025	.0017	< .0001

Results of Preliminary Samples
(Surface Grab Samples)
Prior to Resource Studies

APPENDIX L

RESOURCE EVALUATION OF ANDERSON ENTERPRISES
SOUTH TACOMA PROPERTY - 1985

BENLAB Since 1913
Bennett Laboratories, Inc., a subsidiary of Bencorp, Inc.
901 SOUTH 9th STREET • P.O. BOX 5816 • TACOMA, WASH. 98405 • (206) 272-4507 SEATTLE 624-0570/TELEX 152556SLA

RESOURCE EVALUATION OF ANDERSON ENTERPRISES SOUTH TACOMA PROPERTY

TABLE OF CONTENTS

TABLE OF CONTENTS CONT.

PLATES

BENLAB Since 1913
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RESOURCE EVALUATION

INTRODUCTION

On February 6, 1985, Earth Consultants, Inc. in association with Bennett Laboratories of Tacoma, Washington was authorized to proceed with soil sampling and a chemical testing program for the evaluation of the potential resource from industrial fills which has been placed over an area of roughly one hundred fifty thousand (150,000) square feet (3.5 acres) on the Anderson property in South Tacoma, Washington. This report documents the distribution of fills in the potential resource area, and presents the results of chemical testing along with methods employed to perform the various technical tasks.

SCOPE OF WORK

Activities performed for the evaluation of fill soils at the site can be divided into the following elements:

- A review of the existing body of chemical and hydrologic data for the site.
- Development and implementation of a safety plan for the site. ~~tuned to anticipated physical layout and potential contamination.~~
- Soil sampling and transport of soil samples to the laboratory.
- Chemical analyses.
- Review and compilation of all test results and preparation of summary report.

METHODOLOGY

Preliminary Review and Preparation

Site Visit

Prior to commencement of actual field work for the sampling program, an effort was made to review the physical distribution of potentially contaminated soils at the site and to assess possible difficulties such as adverse terrain, utilities, etc. Thomas R. Anderson provided a tour for the entire site, which is located ~~on~~ at 5202 South Proctor Street, north of South 56th Street in south Tacoma, Washington. (See Vicinity Map, Plate 1).

Safety Plan

The technical team places considerable emphasis on maintaining the safety and health of personnel in the field associated with sampling programs such as the one undertaken for this project. A safety plan was developed specifically for application to the Anderson property project and appears as Appendix B to this report. The document provides for precautions, personal safety equipment, decontamination and safety procedures, including emergencies.

Criteria for the safety plan and designation of personal equipment including proper respirators and outerwear were developed by reviewing data from preliminary laboratory test results from Bennett Laboratories, as well as reconnaissance level sampling and testing results compiled for the South Tacoma Swamp Study for the U. S. Environmental Protection Agency. Considerations included metals with possible PAH concentrations at some locations.

Sample Collection

Survey and Staking

Prior to actual sampling, it was deemed necessary to establish a control grid on the ground which could contribute to the overall efficiency of the field sampling, and provide added resolution for later analyses of laboratory test results. Using a geologist's Brunton compass and reel tape, baselines tied to known fixed referenced points including building walls were established; stationing along the baselines in addition to distance measurements from the baselines made it possible to locate each sampling location with a fair degree of accuracy within limits implied by these methods.

Excavation and Sampling

The excavation sub-contractor retained for this phase of work was Continental Dirt Company of Kent, Washington.

Equipment employed for the actual sampling exavation consisted of a track-mounted Hitachi Model T1720261 backhoe with a reach-capability of twenty two (22) feet and a fifty six (56) inch bucket width.

Under the supervision of the field geologist, the backhoe was brought into position over each sampling location. As conditions permitted, each test pit was excavated and sequentially sampled with the maximum depth for each pit being controlled by the thickness of the fill deposits overlying the natural undisturbed native soils. As one of the overall objectives for the program was to define the thickness for potentially contaminated materials, each pit was advanced to a depth below the contact between fill and native soils.

Upon completion of each excavation a scale detailed log was made of each test pit. Logging procedure consisted of a visual inspection of the pit followed by notation of significant features including soil types, lithologic contacts, cultural debris and sample locations. Ground level adjacent to each pit was used as reference with vertical control provided by a small hand tape. Photographs were taken of particular locations and/or strata of interest.

Samples taken from various depths in each pit were placed in prepared labeled glass jars furnished by Bennett Laboratories.

Sample jars were stored in ice-packed chests at the site and were transferred to the lab daily during the sampling program to minimize excessive dissipation of volatile fraction hydrocarbons. Each jar was clearly labeled as to test pit number, sample number, geologist, site name and date.

To establish chain of custody, transfer in the field was documented on a standardized sample control form by logging sample numbers or lots as they were received by laboratory personnel.

noet

Chemical Analytical Testing

A workplan generally similar to those used for resource evaluations connected with known ore bodies was followed for the assessment of the site for possible commercial exploitation of Lead bearing materials. In this respect, both vertical and horizontal distribution of Pb were determined throughout the fill material and total tonnage estimated based on vertical exploration to depth of native soils underlying the fill, and horizontally to the extent of fill-native contacts on the surface.

Total Pb values were determined by first preparing samples in the usual manner in which mining assays are prepared. Samples were crushed to - 3/8 inch by chipmunk crusher, then pulverized to - 200 mesh, unless the sample consisted of fine, soft material (which smears badly on pulverizer plates) in which case the sample was screened to - 80 mesh. Samples were digested with hot concentrated Nitric Acid and subsequently analyzed by atomic absorption spectrophotometry. Total Arsenic was analysed as well for both resource and environmental evaluation purposes.

An added dimension to this program was the use of a backhoe, rather than a drill, to obtain samples at depth. By utilizing this method, an extensive visual examination of fill materials was possible to help better delineate fill composition and homogeniety.

RESULTS OF INVESTIGATION

Distribution of Slag-Fill Deposits

The Test Pit Location Plan, Plate 2, illustrates the position of various test pits and sampling locations for this study in relation to existing access roads, buildings and topography in the area.

The topography portrayed on the Test Pit Location Plan, Plate 2 highlights a north-south treding slope which separates an elevated plateau to the east which supports the existing foundry building from lowlands to the west. It is apparent that the toe of the slope marks the general maximum western extent for the slag/fill materials encountered in the test pits.

NEXT

A review of the Test Pit Logs, Plates 5 through ~~19~~ 18 reveals that the fill material is ccmprised of an assortment of slag fragments, refractory bricks, black fine silty-sand, scrap metal, metal cuttings and cinder fragments. A preliminary estimate for the volume of industrial fill in-place west of Proctor Street and south of Test Pits TP-15, TP-16 and TP-17 based upon topographic expresssion and available test pit data is roughly 45,000 to 50,000 cubic yards.

REFERENCES

Black and Veatch, June 1983, Preliminary Site Investigation, South Tacoma Swamp, Tacoma, Washington, USEPA Contract Number 68-03-1614, work assignment Z-3-6, 93 pages.

Walters, K.L., Kimmel, Grant E., 1968, Groundwater Occurrence and Stratigraphy of Unconsolidated Deposits, Central Pierce County, Washington: Water Supply Bulletin No. 22 Washington Department of Natural Resources.

TABLE I

TEST PIT DATA COMPILATION

Test Pit Number	Total Depth (FT)	Thichness of Fill	Maximum Lead Concentration (PPM)
1	14.0	8.0	1250
2	18.0	13.0	N/D
3	14.5	10.0	138
4	18.0	13.5	5690
5	13.0	8.0	1640
6	15.0	10.0	87200
7	17.5	13.5	752
8	18.0	13.0	2900
9	15.0	10.0	1180
10	15.0	11.0	455
11	17.0	13.0	694
12	17.0	13.0	N/D
13	16.0	11.0	1130
14	11.0	7.0	125

N/D = No Data

TABLE II

TOTAL LEAD AND ARSENIC - RESOURCE EVALUATION

	Pb ppm	As ppm
TP1, 2'	1250	.18
TP3, 1'	138	.03
TP4, 0'-.5'	5690	.12
TP4, 2.5'	3530	.05
TP4, 6.5'	581	.14
TP4, 14'	39	.16
TP5, 1'-2'	1640	N/D
TP6, Surface	87200	.05
TP6, 6'	621	.16
TP6, 15'	60	.03
TP7, 1.5'	752	.12
TP7, 17'	26	.08
TP8, 2'	2900	.16
TP8, 7'	313	.16
TP8, 17'	30	.14
TP9, 9'	1180	.17
TP9, 15'	43	.16
TP10, 1'	455	.20
TP10, 6'	267	.17
TP10, 16'	69	.11
TP11, 2'-3'	457	.15
TP11, 10'-12'	694	.14
TP11, 16'-17'	27	.11
TP13, 3'-5'	1130	.20
TP13, 7'-11'	129	.16
TP14, 2'-5'	125	N/D
TP25, 4.5'-6' (Precip.)	477	.04
Surface Grab	16500	N/D

N/D - No Data

~~7 Follow Page 5 2~~

TEST RESULTS AND CONCLUSIONS

Comparing between test pits

Vertical distribution of total Pb values is inconsistent with depth, although values drop in each test pit location as depth of sample increases. Small (approx. 1 cu. ft.) to large (approx. 100 cu. ft.) lenses of diverse materials are scattered throughout the fill at various depths, serving to add to the inhomogeniety of the fill.

The vast majority (particularly larger volume lenses) of the inclusions are siliceous slag of unknown origin. Grab samples of this material reveal virtually no significant content other than silica. Pieces of slag range from small fragments up to approx. 18 in. pieces and "welded" zones of apparently massive slag dumping. Smaller inclusions consist of a variety of metallic and oxidized materials; these are few in number and small (approx. 1-2 cu. ft.) in volume.

The majority of fill material appears to consist of black sand which does not appear to be related to soils native to the area. It is possible that this material is discarded casting sand from the foundry operations.

Horizontal distribution of total Pb values is also inconsistent and generally too low for consideration as a Pb resource. Very localized surface deposits of fine, grey material yielded the highest Pb values, but are of minor consequence relative to overall fill volume. The only samples yielding Pb values of over 1% were strictly surface samples.

For both Pb resource evaluation and for later comparison to EP TOX values relating to environmental considerations, Total As was run on samples, as well. Although consistently low and in acceptable ranges if the fill material were to be processed for Pb, the lack of Pb value would seem to make the As data moot, as regards the resource evaluation.

Based on the analytical and field observation data, it would appear that the fill materials bounded by Proctor Street to the east and TP-15, TP-16 and TP-17 to the north are of generally low grade and insufficient in homogeniety and volume for the site to be considered a potential resource area.

APPENDIX ~~B~~ A

Safety Plan

CONTENTS

INTRODUCTION

The preliminary tests conducted by the EPA indicate that some elevated levels for base neutral compounds and metals may be present. Based on this data, an upgraded version of "Level D" protection is recommended, a hard hat with face shield, chemical resistant boots and outerwear are recommended as personal clothing. In addition, respirators and cartridges for acid vapors, organic vapors, and pesticides are to be on the site.

While excavating, the site must be controlled to reduce the possiblity of (1) personal exposure to contaminations and (2) transport of contaminants by personnel and equipment from the site. This was implemented by establishing three work zones (exclusion zone, contamination reduction zone, and support zone). This is explained in more detail in the "Safety Procedure" section.

The next four sections are composed of lists to facilitate the ease of retrieving information during the preparation phase and field sampling.

STANDARD SAFETY PRECAUTION

1) Do not wear contact lenses in the field

2) No eating, drinking, chewing gum or tobacco, or smoking

3) After leaving site, the entire body should be thoroughly washed as soon as possible after protection garments are removed

4) No excessive facial hair which may interfere with a respirator seal

5) Contact with contaminated material should be avoided whenever possible. Do not walk through puddles, mud, and other discolored surfaces; kneel on ground, lean, sit, or place equipment on drums, containers, or vehicles found at the site

6) Approach site from up-wind direction

PERSONAL PROTECTION EQUIPMENT

Coveralls - chemical resistant (pants and coat)

Gloves - chemical resistant

Boots - chemical resistant, steel toe and shank, cleated

Hard hat - face shield

Particle mask

SAFETY EQUIPMENT

1) First aid kit, blanket

2) Eyewash

3) Respirators (2) with cartridge (acid vapors, organic solvent, pesticide)

4) Minimum of five gallons of water in jerry can for emergency washes

5) Someone on site at all times with CPR certification

DECONTAMINATION EQUIPMENT

(6) long-handle soft-bristle brushes

Detergent (Biodegradable)

Rinse water (in buckets)

(2) trash cans with plastic bag liners (for outerwear that cannot be decontaminated and another can for non-contaminated material, i.e., paper towels, etc)

Paper or cloth towels for drying protective clothing

Galvanized wash tub to hold spent rinse water

Supply of large plastic garbage bags (required at Site 1 and Site 2 in contamination reduction zone)

SAFETY PROCEDURE

The approach to the site should always be from the up-wind direction. During the excavation process, if the digging results in the release of a cloud of vapors, the site should be evacuated and personnel should leave the site for a safe area. In addition, the fire department should be notified. At least three people should be on the site during work periods with one person remaining in the support zone ready to respond to accidents or emergencies. This person will also help during the decontamination process.

A. Description of Zones.

Exclusion Zone is the innermost area of three concentric areas. At both sites, it is the area where the fill material is located. The exclusion zone should be entered at one designated site and exited from another designated site so that cross contamination of zones is reduced. Personnel in this area must be in full protective clothing.

Support Zone is the outermost part of the site and is considered clean. Support equipment (command post and equipment truck) is located in this zone.

The equipment truck and command post should be sited in the support zone so they are upwind of the exclusion zone. The exact location of the equipment truck will have to be determined each day based on the wind and weather conditions.

Equipment (excavating and protective clothing) that has been used in the exclusion zone must be decontaminated the contamination reduction zone before it re-enters the support zone.

Contamination Reduction-Zone is between the exclusion zone and the support zone. This area serves as a buffer to reduce the probability of contaminating the support zone. Personnel entering the contamination reduction zone from the support zone should be wearing full protective clothing.

Two decontamination sites will be established in the contamination reduction zone. Site 1 will be at the interface with the exclusion zone. The first decontamination rinse will take place on site. After all personnel and equipment are finished with decontamination site 1, they proceed to site 2. The second site will be closer to the interface with the support zone. At site 2 the second rinse will be performed and the protective clothing removed.

B. Decontamination Process

Site 1

Protective clothing (Still being worn) will be cleaned with a detergent-water solution and scrub brushes. The rinse water will be collected in galvanized wash tubs.

The machinery will be hosed off with water (if possible, under pressure)

Site 2

The procedure listed above is repeated

If protective clothing cannot be cleaned it will be placed in a plastic-lined trash can and properly disposed of at the end of the project

After the second rinse, the protective clothing should be dried and removed before entering the support zone

The third person in the support zone will don protective clothing and assist with the decontamination process. Before this person leaves the contamination reduction zone and enters the support zone, the outerwear clothing will be rinsed and wiped dry.

During the decontamination process all personnel and equipment leaving the exclusion zone will proceed as a unit from site 1 to site 2.

At the end of each day, the equipment (including outerwear clothing) will be placed in separate plastic bags before being loaded into the truck. This should reduce cross-contamination and reduce the chance of contaminating the truck. At the start of each day, the equipment will be removed from the bags and the bags will be discarded.

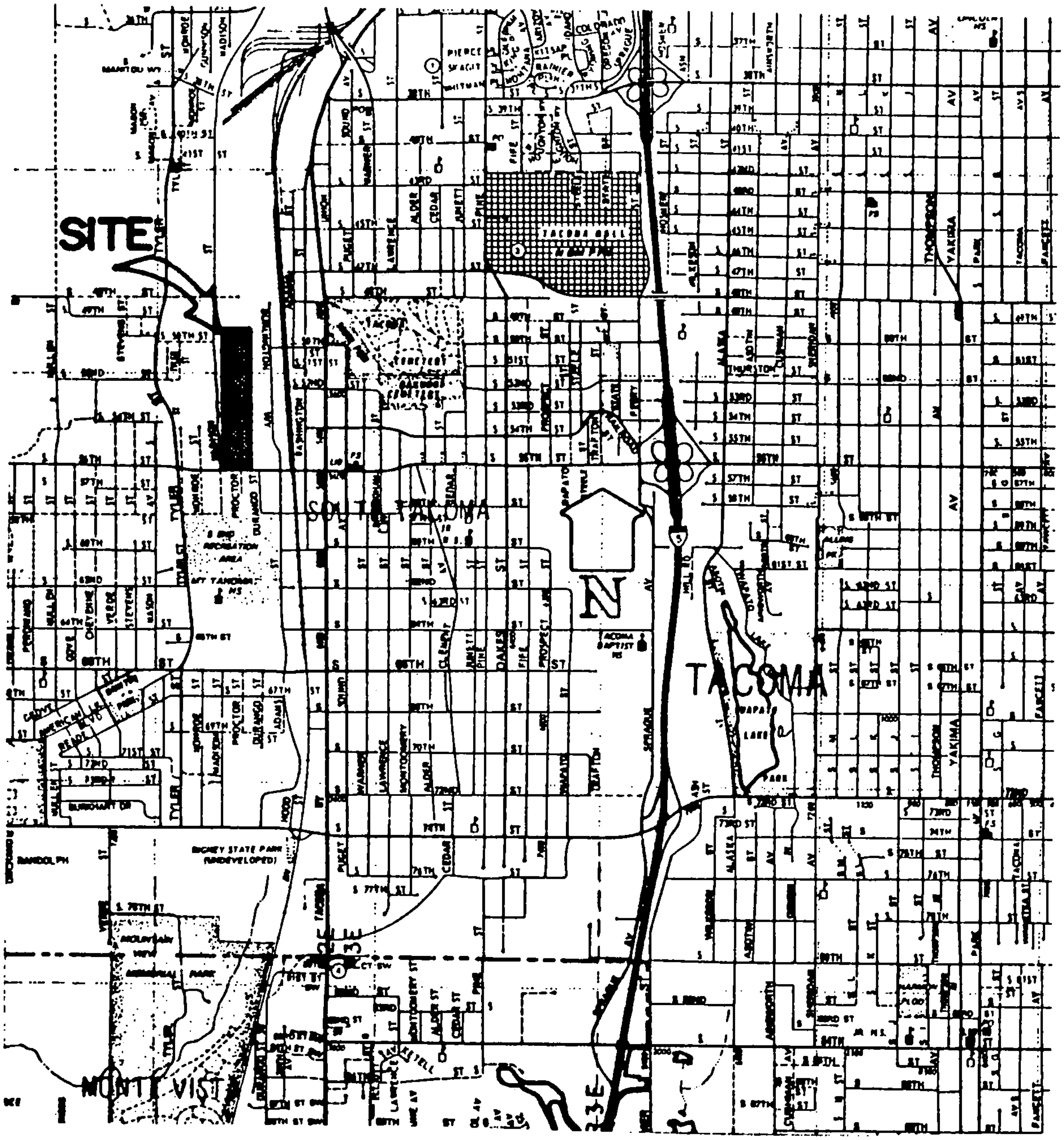
C. Decontamination During a Medical Emergency

If the injury is minor, the standard decontamination procedures should be followed before medical treatment is administered (at the site or at a medical facility). Lifesaving care should always be instituted immediately without considering decontamination. If the chemical contaminant is inhaled, medical treatment by a physician is required. If the contaminant is on the skin or in the eyes, the area should be flooded with water immediately after contact and treatment administered at a medical facility.

APPENDIX I

Hospital - Anderson Site

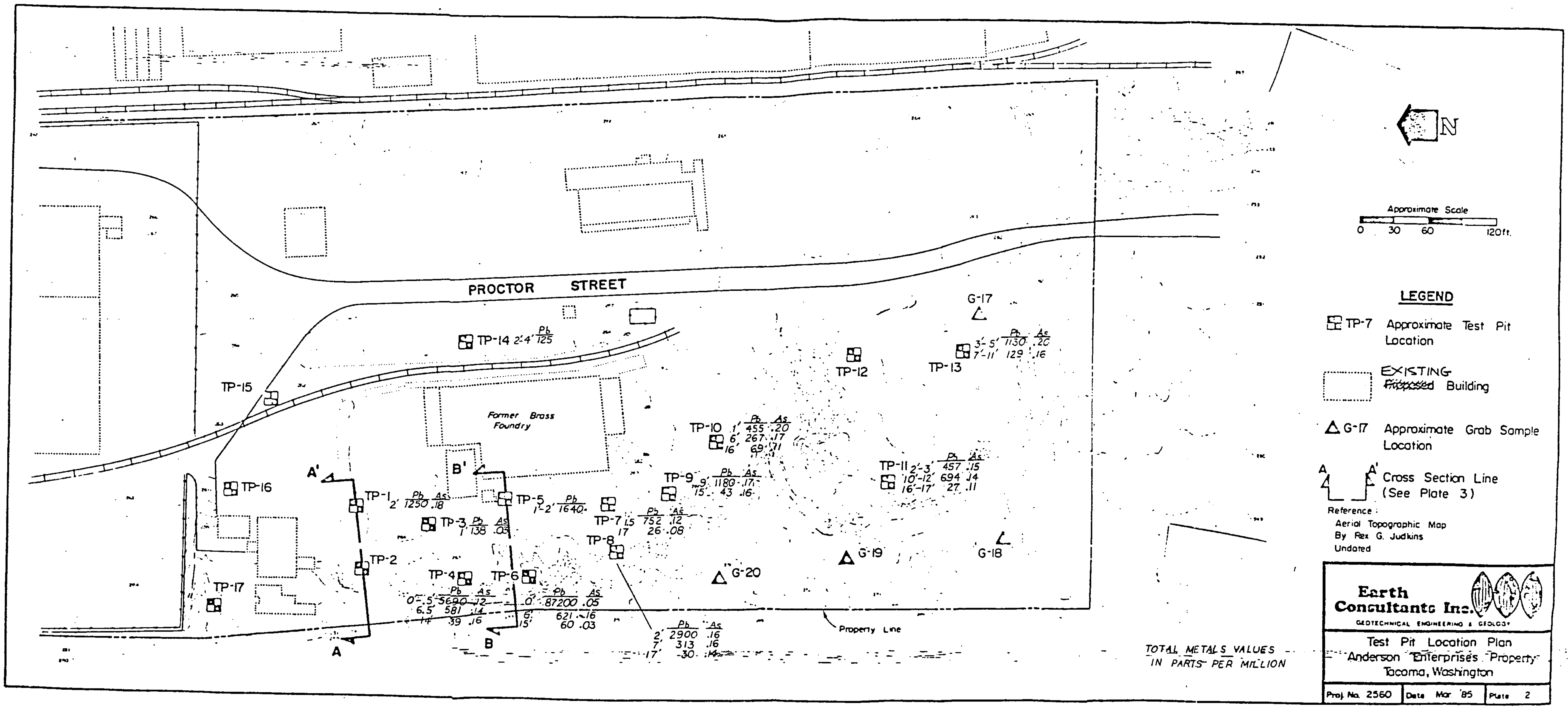
NAME:	Tacoma General
ADDRESS:	315 South K Street Tacoma, Washington
TELEPHONE:	594-1100
TRAVEL TIME:	15 minutes
DIRECTION:	I-5 north to Sprague Exit, Sprague north to Division, Division to South K to hospital

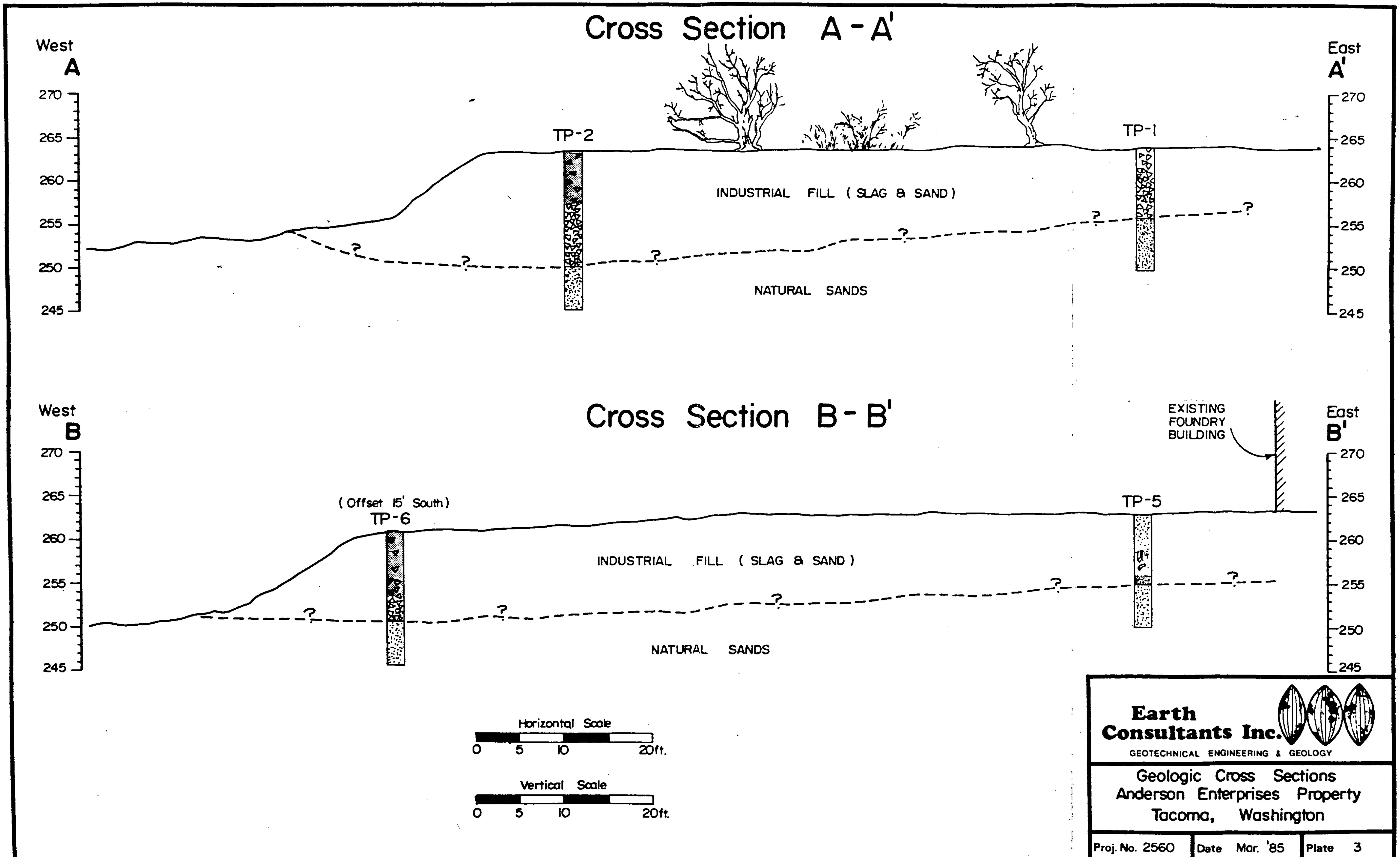


Earth Consultants Inc.
GEOTECHNICAL ENGINEERING & GEOLOGY

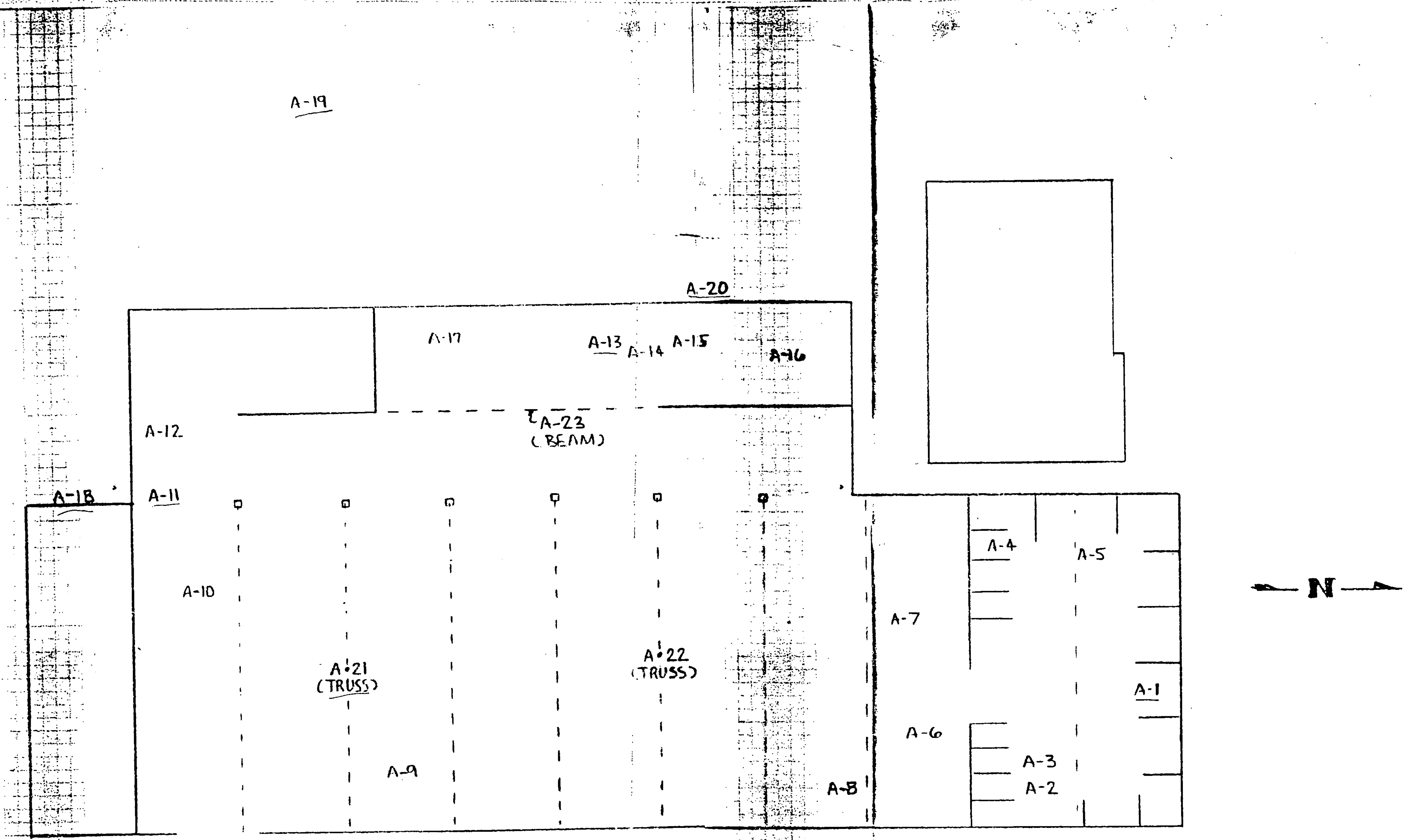
Vicinity Map
Anderson Enterprises Property
Tacoma, Washington

Proj. No. 2560	Date Mar. '85	Plate 1


PROCTOR STREET
Former Brass Foundry
TP-1 2' Pb 1250 As .18
TP-2
TP-3 1' Pb 138 As .05
TP-4 Pb As 0-.5 5690 .12 6.5 581 .14 14 39 .16
TP-5 1-2' Pb 1640
TP-6 Pb As 0' 87200 .05 6' 621 .16 15' 60 .03
TP-7 15 Pb 752 As .12 17 26 .08
TP-8 Pb As 2' 2900 .16 7' 313 .16 17' 30
TP-9 9' Pb 1180 As .17 15' 43 .16
TP-10 1' Pb 455 As .20 6' 267 .17 16' 69 .11
TP-11 2'-3' Pb 457 As .15 10'-12' 694 .14 16'-17' 27 .11
TP-12
TP-13 3'-5' Pb 1130 As .20 7'-11' 129 .16
TP-14 2-4' Pb 125
TP-15
TP-16
TP-17
G-17
G-18
G-19
G-20
A
A'
B
B'
Property Line
TOTAL METALS VALUES IN PARTS PER MILLION
N
Approximate Scale
0 30 60 120ft.
LEGEND
TP-7 Approximate Test Pit Location
EXISTING ~~Proposed~~ Building
G-17 Approximate Grab Sample Location
A A' Cross Section Line (See Plate 3)
Reference: Aerial Topographic Map By Rex G. Judkins Undated
Earth Consultants Inc.
GEOTECHNICAL ENGINEERING & GEOLOGY
Test Pit Location Plan
Anderson Enterprises Property
Tacoma, Washington
Proj. No. 2560
Date Mar '85
Plate 2



Cross Section A-A'
West
A
East
A'
270
265
260
255
250
245
TP-2
TP-1
INDUSTRIAL FILL (SLAG & SAND)
NATURAL SANDS
Cross Section B-B'
West
B
East
B'
EXISTING FOUNDRY BUILDING
(Offset 15' South)
TP-6
TP-5
INDUSTRIAL FILL (SLAG & SAND)
NATURAL SANDS
Horizontal Scale
0 5 10 20ft.
Vertical Scale
0 5 10 20ft.
Earth Consultants Inc.
GEOTECHNICAL ENGINEERING & GEOLOGY
Geologic Cross Sections
Anderson Enterprises Property
Tacoma, Washington
Proj. No. 2560
Date Mar. '85
Plate 3



APPROX. SAMPLE LOCATIONS.
TACOMA INDUSTRIAL PROPERTIES
TC-86-8380

MAJOR DIVISIONS			GRAPH SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTION
Coarse Grained Soils	Gravel And Gravelly Soils	Clean Gravels (little or no fines)		GW gw	Well-Graded Gravels, Gravel-Sand Mixtures, Little Or No Fines
				GP gp	Poorly-Graded Gravels, Gravel-Sand Mixtures, Little Or No Fines
	More Than 50% Coarse Fraction Retained On No 4 Sieve	Gravels With Fines (appreciable amount of fines)		GM gm	Silty Gravels, Gravel-Sand-Silt Mixtures
				GC gc	Clayey Gravels, Gravel-Sand-Clay Mixtures
More Than 50% Material Larger Than No 200 Sieve Size	Sand And Sandy Soils	Clean Sand (little or no fines)		SW sw	Well-Graded Sands, Gravelly Sands, Little Or No Fines
				SP sp	Poorly-Graded Sands, Gravelly Sands, Little Or No Fines
	More Than 50% Coarse Fraction Passing No. 4 Sieve	Sands With Fines (appreciable amount of fines)		SM sm	Silty Sands, Sand-Silt Mixtures
				SC sc	Clayey Sands, Sand-Clay Mixtures
Fine Grained Soils	Silts And Clays	Liquid Limit Less Than 50		ML ml	Inorganic Silts & Very Fine Sands, Rock Flour, Silty-Clayey Fine Sands; Clayey Silts w/ Slight Plasticity
				CL cl	Inorganic Clays Of Low To Medium Plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean
				OL ol	Organic Silts And Organic Silty Clays Of Low Plasticity
More Than 50% Material Smaller Than No 200 Sieve Size	Silts And Clays	Liquid Limit Greater Than 50		MH mh	Inorganic Silts, Micaceous Or Diatomaceous Fine Sand Or Silty Soils
				CH ch	Inorganic Clays Of High Plasticity, Fat Clays
				OH oh	Organic Clays Of Medium To High Plasticity, Organic Silts
Highly Organic Soils				PT pt	Peat, Humus, Swamp Soils With High Organic Contents

Topsoil		Humus And Duff Layer
Fill		Highly Variable Constituents

The Discussion In The Text Of This Report Is Necessary For A Proper Understanding Of The Nature Of The Material Presented In The Attached Logs

Notes :
Dual symbols are used to indicate borderline soil classification. Upper case letter symbols designate sample classifications based upon laboratory testing; lower case letter symbols designate classifications not verified by laboratory testing.

- I 2" O.D. SPLIT SPOON SAMPLER
- II 2.4" I.D. RING SAMPLER OR SHELBY TUBE SAMPLER
- P SAMPLER PUSHED
- * SAMPLE NOT RECOVERED
- ∇ WATER LEVEL (DATE)
- WATER OBSERVATION WELL

- C TORVANE READING, tsf
- qu PENETROMETER READING, tsf
- W MOISTURE, percent of dry weight
- pcf DRY DENSITY, pounds per cubic ft.
- LL LIQUID LIMIT, percent
- PI PLASTIC INDEX

Earth Consultants Inc.
GEOTECHNICAL ENGINEERING & GEOLOGY

LEGEND

Proj. No. 2560	Date Mar. '85	Plate 4

TEST PIT NO. 1

Logged By SB

Date 2/18/85

Elev. 264±

Depth (ft.)	USCS	Soil Description	W (%)	Pb (ppm)
0–8		angular slag up to 18" nominal diameter, insignificant fines @5-6' apparent "welded" zone-perhaps placed hot and molten		1250
8–14	sp sm	light brown SAND with silt (no apparent dip to strata) becomes tan with light brown mottling		

Test Pit terminated at 14' below existing grade. No groundwater seepage encountered during excavation.

Earth Consultants Inc.
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TEST PIT LOGS
ANDERSON ENTERPRISES PROPERTY
TACOMA, WASHINGTON

Proj. No. 2560	Date Mar.'85	Plate 5

TEST PIT NO. 2

Logged By SB

Date 2/18/85

Elev. 263±

Depth (ft.)	USCS	Soil Description	W (%)	Pb (ppm)
0		dark gray-black silty fine SAND with 25-35% "slag" pieces, moist		
		cinder lense at 3'		
5		becomes 70-80% slag with up to 8" nominal diameter refractory brick at 5'		
		(roots to 9')		
10				
15	sp sm	light tan with orange mottling fine SAND with silt, moist		
20		Test Pit terminated at 18' below existing grade. No groundwater seepage encountered during excavation.		

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TEST PIT LOGS
ANDERSON ENTERPRISES PROPERTY
TACOMA, WASHINGTON

Proj. No. 2560 | Date Mar. '85 | Plate 6

TEST PIT NO. 3

Logged By SB
Date 2/19/85

Elev. 264±

Depth (ft.)	USCS	Soil Description	W (%)	Pb (ppm)
0		brown silty SAND with roots		138
	35°	black-dark gray metallic luster "SAND" grain size		
		cinder layer with refactory bricks (roots to 3')		
5		dark brown to black silty SAND with 50-60% slag pieces ranging from 2-3" up to 6" nominal diameter		
		2-3" angular slag with little to no fines		
10	20°			
	sp sm	light brown SAND, fine with silt		
		becomes tan with brown mottling		
15		Test Pit terminated at 14.5' below existing grade. No groundwater seepage encountered during excavation.		
20				

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TEST PIT LOGS
ANDERSON ENTERPRISES PROPERTY
TACOMA, WASHINGTON

Proj. No. 2560	Date Mar. '85	Plate 7

TEST PIT NO. 4

Logged By SB

Date 2/18/85

Elev. 262±

Depth (ft.)	USCS	Soil Description	W (%)	Pb (ppm)
0		light brown silty gravelly SAND with lumber debris		5690
		black with some iron staining, silty SAND with 40-50% slag exhibiting some cementation and minor scrap metal, zones of increasing % slag to 70% @ 1.5-3' and 6-7.5'		3530
5		minor isolated zone of FeO_2 staining @ 18°↓W		581
		(roots to 9.5')		
10		black "slag" up to 18" nominal diameter with little or no fines		
		black silty SAND with trace small slag fragments		39
15	sm	tan with orange mottling SAND, fine with silt, moist		
		decreased mottling		
20		Test Pit terminated at 18' below existing grade. No groundwater seepage encountered during excavation.		

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TEST PIT LOGS
ANDERSON ENTERPRISES PROPERTY
TACOMA, WASHINGTON

Proj. No. 2560 | Date Mar. '85 | Plate 8

TEST PIT NO. 5

Logged By SP

Date 2/18/85

Elev. 263±

Depth (ft.)	USCS	Soil Description	W (%)	Pb (ppm)
0	30°	dark brown SAND with silt, 30-40% slag, wood fragments, gravel		1640
		scattered refractory bricks @ 3-4' predominately and isolated to 7'		
5		slag-angular ranging to 8" nominal diameter, some dark brown sandy lenses comprising < 15% by weight, some copper stained pieces-isolated		
	10°	black SAND with silt < 5% slag		
		light brown SAND with silt		
10	sp sm	becomes tan at 9.5'		

Test Pit terminated at 13' below existing grade. No groundwater seepage encountered during excavation.

15

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TEST PIT LOGS
ANDERSON ENTERPRISES PROPERTY
TACOMA, WASHINGTON

Proj. No. 2560	Date Mar.'85	Plate 9

TEST PIT NO. 6

Logged By SR

Date 2/18/85

Elev. 2613

Depth (ft.)	USCS	Soil Description	W (%)	Pb (ppm)
0		dark gray silty SAND with < 10% slag, moist		87,200
	20°	dark brown/black silty SAND with 40-50% slag, moist, exhibiting slight to medium cementation		
5		slag up to 20" nominal diameter		621
		scattered refractory brick from 6-7'		
		90% slag with fines comprised of slag debris		
10	sp	tan/brown mottled SAND		
		decreased mottling at 13'		
15				60

Test Pit terminated at 15' below existing grade. No groundwater seepage encountered during excavation.

20

$$\frac{87200}{1000000} = 8.7\%$$

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TEST PIT LOGS
ANDERSON ENTERPRISES PROPERTY
TACOMA, WASHINGTON

Proj. No. 2560 | Date Mar.'85 | Plate 10

TEST PIT NO. 7

Logged By SB

Date 2/19/85

Elev. 264±

Depth (ft.)	USCS	Soil Description	W (%)	Pb (ppm)
0		black iron-stained SAND with 60-70% slag (partially welded), with isolated brick fragments		752
	20°	black silty SAND		
		very hard layer		
5	25°	(minor steel cuttings) black iron-stained slag (85-90%), with black sand, isolated brick fragments and cinder lenses		
		lense of black SAND with 5-60% slag		
10		black glassy slag up to 18" nominal diameter, some olive coloration, little or no fines		
	10°			
15	sp sm	light brown SAND with silt, becomes light tan with slight mottling		26

Test Pit terminated at 17.5' below existing grade. No groundwater seepage encountered during excavation.

20

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TEST PIT LOGS
ANDERSON ENTERPRISES PROPERTY
TACOMA, WASHINGTON

Proj. No. 2560	Date Mar.'85	Plate 11

TEST PIT NO. 8

Logged By SB

Date 2/18/85

Elev. 262±

Depth (ft.)	USCS	Soil Description	W (%)	Pb (ppm)
0		black iron-stained coarse SAND, moist, isolated lumber debris with 40-50% slag		2900
5				313
	20°	scattered refractory bricks at 8-9'		
10		black slag with little or no fine matrix, slag sizes range to 18" nominal diameter		
15	sp sm	tan/light brown mottled SAND, fine with silt, moist		
		becomes light tan in color and decreased mottling		30
20		Test Pit terminated at 18' below existing grade. No groundwater seepage encountered during excavation.		

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TEST PIT LOGS
ANDERSON ENTERPRISES PROPERTY
TACOMA, WASHINGTON

Proj. No. 2560 | Date Mar.'85 | Plate 12

TEST PIT NO. 9

Logged By SB

Date 2/18/85

Elev. 260±

Depth (ft.)	USCS	Soil Description	W (%)	Pb (ppm)
0		tan silty gravelly SAND, moist, loose		
		black SAND with some slag, moist, trace organic (wood) fragments		
5		black/brown SAND, fine, with 30% slag pieces < 4" diameter, minor iron stained zones		
	25°	70-80% black slag with black sand matrix, well "cemented"		1180
10	sp sm	light tan mottled SAND with silt, fine, moist		
		becomes lighter tan		
15				43

Test Pit terminated at 15' below existing grade. No groundwater seepage encountered during excavation.

20

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TEST PIT LOGS
ANDERSON ENTERPRISES PROPERTY
TACOMA, WASHINGTON

Proj. No. 2560	Date Mar. '85	Plate 13

TEST PIT NO. 10

Logged By SB

Date 2/18/85

Elev. 261'

Depth (ft.)	USCS	Soil Description	W (%)	Pb (ppm)
0		dark brown iron stained silty SAND with 35-40% slag/gravel		455
		predominately slag up to 12" diameter with little or no fines		267
5		dark gray/black SAND with silt and 15-20% slag		
		slag increases to 70-75% with some fine matrix		
10				
	sp sm	light brown SAND with silt, moist		
		becomes tan		
15				69

Test Pit terminated at 15' below existing grade. No groundwater seepage encountered during excavation.

20

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TEST PIT LOGS

ANDERSON ENTERPRISES PROPERTY
TACOMA, WASHINGTON

Proj. No. 2560	Date Mar.'85	Plate 14

TEST PIT NO. 11

Logged By SB
Date 2/19/85
Elev. 263±

Depth (ft.)	USCS	Soil Description	W (%)	Pb (ppm)
0		dark brown gravelly silty SAND, fine with scattered organics		457
	30°	black silty SAND with 70-80% slag up to 18" diameter, and bricks		
5		dark brown/black silty SAND with 40% slag up to 4" and scattered refractory brick		
10	25°	becomes more black in color, isolated branches		694
	10°			
	sp sm	light brown SAND with silt, moist		
5		becomes tan with minor light brown mottling		27

Test Pit terminated at 17' below existing grade. No groundwater seepage encountered during excavation.

20

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TEST PIT LOGS
ANDERSON ENTERPRISES PROPERTY
TACOMA, WASHINGTON

Proj. No. 2560 | Date Mar. '85 | Plate 15

TEST PIT NO. 12

Logged By SB

Date 2/19/85

Elev. 263±

Depth (ft.)	USCS	Soil Description	W (%)	Pb (ppm)
0		brown iron stained SAND with silt, 40-50% slag and scattered refractory bricks		
	30°			
5		black SAND, fine to medium, with metallic luster, 10-15% slag < 4" nominal diameter		
	30°	brown iron stained SAND with 60-70% slag up to 12" nominal diameter		
10		light brown iron stained gravelly SAND with silt, scattered refractory bricks, slag, scrap iron		
	5°			
15	sp sm	light brown SAND with silt, becomes tan at 14.5'		
	gp	becomes tan sandy GRAVEL		
20		Test Pit terminated at 17' below existing grade. No groundwater seepage encountered during excavation.		

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TEST PIT LOGS
ANDERSON ENTERPRISES PROPERTY
TACOMA, WASHINGTON

Proj. No. 2560 | Date Mar.'85 | Plate 16

TEST PIT NO. 13

Logged By SB

Date 2/19/85

Elev. 261±

Depth (ft.)	USCS	Soil Description	W (%)	Pb (ppm)
0–5	20°	dark brown iron stained fine SAND matrix in 80% slag ranging from 2" to 6" nominal diameter		1130
5–11		black fine SAND matrix in 95% slag up to 18" nominal diameter (no apparent bedding)		129
11–14	sp	light brown SAND, fine		
14–16	gp	tan sandy GRAVEL		

Test Pit terminated at 16' below existing grade. No groundwater seepage encountered during excavation.

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TEST PIT LOGS

ANDERSON ~~ENTERPRISES~~ PROPERTY
TACOMA, WASHINGTON

Proj. No. 2560 | Date Mar.'85 | Plate 17

TEST PIT NO. 14

Logged By SB
Date 2/19/85
Elev. 264±

Depth (ft.)	USCS	Soil Description	W (%)	Pb (ppm)
0		dark brown/black gravelly SAND with 15-20% slag, moist		
		gray silty SAND with 30-40% slag, red building bricks, concrete footing pad (flat lying contact)		125
5		dark brown silty gravelly SAND, fine (may be original topsoil?)		
	gp	tan/orange mottled sandy GRAVEL, fine to medium		
10		becomes grayish at 9'		

Test Pit terminated at 11' below existing grade. No groundwater seepage encountered during excavation.

Depth scale: 0, 5, 10, 15

Logged By SB
Date 2/20/85

TEST PIT NO. 15

Elev. 262±

Depth (ft.)	USCS	Soil Description	W (%)	Pb (ppm)
0		gray/brown silty SAND, very fine to fine, with gravels, minor gray lenses (insignificant inclination)		
		dark brown gravelly silty SAND, fine, with roots		
5	gp	tan w/light orange mottling sandy GRAVEL		

Test Pit terminated at 7.5' below existing grade. No groundwater seepage encountered during excavation.

Depth scale: 0, 5, 10, 15

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GEOTECHNICAL ENGINEERING & GEOLOGY

TEST PIT LOGS
ANDERSON ENTERPRISES PROPERTY
TACOMA, WASHINGTON

Proj. No. 2560	Date Mar. '85	Plate 18

APPENDIX M

SOIL SAMPLING AND CHEMICAL TESTING
ANDERSON ENTERPRISES PROPERTY - 1985

SOIL SAMPLING & CHEMICAL TESTING

ANDERSON ENTERPRISES PROPERTY

TACOMA, WASHINGTON

E-2560

FOR

THOMAS R. ANDERSON, PRESIDENT

Earth Consultants Inc.

Geotechnical Engineering and Geology

September 16, 1985 E-2560

Thomas R. Anderson, President
Anderson Enterprises, Inc.
1123 Port of Tacoma Road
Tacoma, Washington 98421

Subject: Report
Soil Sampling and Chemical Testing
Anderson Enterprises Property
Tacoma, Washington

Dear Mr. Anderson:

Transmitted herewith is our report of Soil Sampling and Chemical Analyses for the parcel of property located in South Tacoma, north of South 56th Street and east of Madison Street. This report has been prepared in association with Bennett Laboratories, Incorporated of Tacoma, Washington, to summarize the findings of recent test pit excavations and chemical analyses of representative samples taken from the site fill and native soils.

Should you have questions concerning this report, feel free to contact us. Earth Consultants, Inc. is available to discuss our findings at your convenience.

Respectfully submitted,

EARTH CONSULTANTS, INC.

John J. Moran

John J. Moran, P.E.
Project Manager

JJM/tm

1805 - 136th Place N.E., Suite 101, Bellevue, Washington 98005
Phone: (206) 643-3780/Seattle (206) 464-1584

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PLATES

TABLE OF CONTENTS

INTRODUCTION

On February 6, 1985, Earth Consultants, Inc. in association with Bennett Laboratories of Tacoma, Washington, was authorized to proceed with a sampling and chemical testing program of soils and industrial fill materials found on the Anderson Enterprises property in Tacoma, Washington. The site is located on Proctor Street, north of South 56th Street. This report documents the results of chemical analyses along with the methods employed to perform the various technical tasks.

SCOPE OF WORK

Activities performed for the evaluation of soils at this site consist of:

.. A review of historical data to establish previous uses of the property.

.. Observations of site conditions to plan efficient sampling methods.

.. A review of existing chemical and hydrologic data for the site.

.. Development and implementation of a site safety plan for the anticipated physical and chemical conditions.

.. Obtaining, preserving and transporting soil samples to the chemical laboratory.

.. Chemical analyses for lead, arsenic, six additional heavy metal elements, halogenated hydrocarbons and polycyclic aromatic hydrocarbons.

.. Review and compilation of test results and preparation of this summary report.

STUDY METHODOLOGY

Pre-Sampling Activities

On February 14, 1985, a tour of the site was made by representatives of Anderson Enterprises, Inc., Bennett Laboratories, Inc. and Earth Consultants, Inc. The surficial distribution of fill materials and location of structures were observed to develop an efficient sampling program. Obstructions to the proposed sampling activities, such as adverse terrain or buried utility facilities, were also noted.

The primary purpose of this study was to examine surficial fill materials overlaying natural soils on the site. Observations, experience and previous near site studies indicated that the fill was composed of industrial wastes, including casting sand, slag and brick with lesser quantities of other inorganic and organic debris. Due to this origin and to distinguish it from natural earth fills, this material is described as "industrial fill." Generally, industrial fills are relatively shallow in depth and heterogeneous in composition and placement. Backhoe excavated test pits were selected as the principal exploration technique for the ability to expose relatively large pit wall areas for observation and to allow discrete sampling of specific fill materials.

Sampling locations were selected on the basis of the site observations and historical records of previous site usage. Prominent physical features such as mounds, ditches and surface discolorations were designated for test pit excavation, if accessible within the property boundaries. Test pits were also placed adjacent to the western edge of the filled area and at other selected locations to delineate the extent and depth of industrial fill material, as well as its chemical and physical characteristics. Inaccessible areas of interest on the property, including locations within or between structures, were sampled by manual methods using standard hand tools (i.e. "grab" samples). Grab samples were also designated near the southwest property corner, representing the only exposed area of natural or non-fill soils on the site.

A site safety plan was developed for this project. Criteria for the safety plan and designation of personal equipment were developed after reviewing data from preliminary laboratory analyses by Bennett Laboratories and similar results compiled for the South Tacoma Swamp study by the U.S. Environmental Protection Agency. Considerations included metals with possible PAH concentrations at some locations.

Sampling Activities

Sampling and test pit locations were mapped by compass direction and tape distance to existing structural features including buildings and fencelines.

The Continental Dirt Company of Kent, Washington, was retained to perform the excavations. Equipment employed for the excavation consisted of a track-mounted Hitachi Model T1720261 backhoe with a reach-capability of twenty two (22) feet and a fifty six (56) inch bucket width.

Each test pit was excavated through the industrial fill materials and into the natural earth soils. After excavation, a detailed log was prepared of the exposed test pit wall. Significant features, including soil types, lithologic contacts, cultural debris and sample locations were noted on the log form.

Ground level adjacent to each test pit was used as vertical control reference with depth measurements provided by hand tape.

Test pit walls and individual samples were visually examined to select those areas suspected of the highest levels of lead, arsenic, polycyclic aromatic hydrocarbons (PAH), and/or halogenated hydrocarbons (HH). Surface and subsurface samples were obtained to characterize materials representative of the test pits and discolored localized surficial materials.

Samples taken from the test pits and grab samples were placed in glass jars furnished by Bennett Laboratories. Sample containers consisted of one quart glass jars washed with dilute nitric acid, rinsed with deionized water, followed by a methylene chloride rinse and then allowed to air dry. Some grab samples having only visual inspection interest were placed in zip-lock bags. Each jar was clearly labeled as to test pit number, sample number, geologist, site name and date. The sample jars were then placed in ice-packed chests at the site and transferred to the laboratory daily during the sampling program.

Chemical Analysis

Results of the chemical analyses are presented on Tables I, II and III. In addition, lead concentrations are shown on the test pit logs, Plates 5 through 30, to provide a direct comparison with depth and physical characterization.

Analytical parameters were selected on the basis of historical data regarding past site activities, data reported in the Black and Veatch study of the South Tacoma Swamp and observed surface characteristics.

Analytical methods were performed in conformance with WDOE 83-13, Chemical Testing Methods, as provided for by WDOE 173-303. Analyses for metals were performed by atomic absorption spectrophotometer after a twenty four (24) hour extraction period in 0.5 normal acetic acid as specified by the EP Toxicity methodology. Minimum detection limits for lead and arsenic are 0.01 parts per million (ppm). Organic analyses conformed to methods designated in WDOE 83-13 utilizing procedures cited in EPA SW 846 method 8120 for Halogenated Hydrocarbon and Polycyclic Aromatic Hydrocarbons. Detection limits for the organic analyses are 0.01 mg/g (10 ppm).

RESULTS OF STUDY

Topographic and Cultural Features

The Test Pit Location Plan, Plate 2, illustrates the position of test pits and surface sampling locations for this study. Most of the surface within the boundaries of the study area is relatively flat and level. In the southern one-third of the property, the dominant topographic feature consists of an irregular north-south trending slope formed by coalescing lobes of industrial fill placed over native sands and gravels. The slope separates the elevated plateau to the east which supports the existing foundry building from lowlands to the west. The toe of the slope marks the maximum western extent of industrial fill materials encountered in the test pits.

The central one-third of the site is occupied by a large building which formerly housed a foundry with attendant machine shops and cleaning rooms. To the west of the foundry building lies a paved parking area underlain by as much as thirteen (13) feet of slag, refractory bricks, metal fragments and other cultural debris.

Distribution of Industrial Fill

The Test Pit Data Compilation, Table I provides a tabular summary of fill thickness at the sampling locations. Within the study area, the thickness of fill ranged from one to thirteen and one-half (13.5) feet with an average thickness of approximately eight feet. The Test Pit Logs, Plates 5 through 30, present a summary of materials encountered in each excavation along with details regarding moisture, bedding and other physical features. Native soil contacts were readily recognized by their tan/brown mottled appearance, as opposed to the black sandy material with inclusions that were the predominant characteristics of the fill.

The stratigraphic section exposed in the test pit walls appeared consistent with a scenario of successive depositions of fill material. The inclination of fill strata varied from near horizontal to about 20 or 30 degrees downward towards the outer extremities of filled areas. Inclusions found throughout the fill contained refractory brick, metal turnings and fragments, slag, oxidized precipitates and other assorted cultural debris.

The industrial fill is characterized as dark brown to black silty fine sand with an angular slag component. This matrix material appears to be siliceous and may have originated as casting sand prior to being discarded as fill. Slag appears throughout the fill materials in forms ranging from finely divided fragments to pieces approximately eighteen (18) inches across. Refractory brick occurrences are less concentrated and widely scattered throughout the fill. Inclusions containing materials other than slag and refractory brick appear to be widely and irregularly scattered and average from 1 to 3 cubic feet in volume.

Interior Facilities Inspection

In addition to sampling test pit excavations, inspections were made of the former foundry building, coke storage buildings and a concrete oil house structure. A blueprint for the Griffin Wheel Company, dated January 15, 1925, provided information as to the uses for various parts of the facility. Excepting the coke storage building, all interior rooms had concrete floors which appeared to be sound and free of defects which could permit seepage of fluids or chemicals used during foundry operation. Several small diameter sumps were located in the floors of some buildings; the continuity of plumbing for these sumps was not ascertained during the course of this preliminary study.

The coke building, immediately north of the main foundry building, was dry and covered. A concrete floor slab existed throughout the structure except in one room near the south entrance. A near surface grab sample, G-23A, was obtained from the earth floor of this room.

A visual inspection of a small concrete structure labeled as "Oil House" (see Plate 2) located adjacent to the western property line in the central portion of the property revealed that the building was empty and dry. The interior was viewed through an access port in the roof as the door entrance, facing east towards the foundry building, was entirely blocked by fill.

Groundwater

No groundwater was encountered in any of the shallow test pits excavated as part of this current study. Earlier studies performed in the site area (Black and Veatch, 1983), suggest that the water table may be encountered about thirty five (35) feet beneath the ground surface, and that the direction of groundwater flow is from the southeast toward the northwest.

Analytical Results

Earlier sampling studies (Black and Veatch, 1983) had reported elevated concentrations of lead in some surface samples from the southern one-third of this site. Accordingly, lead was the parameter of primary interest for this current study. Arsenic was analyzed because of its common association with lead and its frequency of occurrence in this geographical area. Options for testing other heavy metals were exercised selectively. Lead and arsenic concentrations for each tested sample are shown on the Test Pit Location Plan, Plate 2, relative to sample depths. This presentation provides a useful, quick overview of the distribution of these parameters across the site. Additional detail for lead, arsenic, metals and organic compounds is presented in Tables II and III and on the individual test pit logs.

The laboratory data presented in Table II, indicates that only one sample, taken from the upper one foot in Test Pit TP-6, contained lead above the maximum concentration level (MCL) of 5 ppm which serves as the lower bounds for designation as dangerous waste in accordance with WDOE Dangerous Waste Regulations, Chapter 173-303-090 WAC. At this location, the lead concentration drops to 0.6 ppm at a depth of three feet and in native soils below the fill, the lead concentration is 0.1 to 0.4 ppm, or essentially background levels. This data indicates that fill deposits containing lead in concentrations above 5 ppm do not extend more than three feet below the surface, and are generally confined to an area immediately surrounding Test Pit TP-6.

The earlier study by Black and Veatch, 1983 also found positive indications of organic compounds in surface and subsurface soil samples. Sampling locations for this current study were selected on the basis of historical documents, evidence of recent site usage and observations of surficial conditions.

Test methods for oil and grease, polycyclic aromatic hydrocarbons (PAH), and halogenated hydrocarbons (HH) were selected as screening procedures for the types of organic compounds reasonably expected to occur on the site fills and soils. Analytical data developed for this current study, as shown on Table III, found no detectable concentration of either PAH or HH and only relatively low concentrations of oil and grease.

We trust this information is adequate for your current needs. If you have any questions or if we may be of further service, please do not hesitate to contact us.

Respectfully submitted,

EARTH CONSULTANTS, INC.

Don W. Spencer

Don W. Spencer
Project Manager/Project Geologist

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BENNETT LABORATORIES

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REFERENCES

Black and Veatch, June 1983, Preliminary Site Investigation, South Tacoma Swamp, Tacoma, Washington, USEPA Contract Number 68-03-1614, work assignment Z-3-6, 93 pages.

Walters, K. L., Kimmel, Grant E., 1968, Groundwater Occurrence and Stratigraphy of Unconsolidated Deposits, Central Pierce County, Washington: Water Supply Bulletin No. 22 Washington Department of Natural Resources.

TABLE I

TEST PIT DATA COMPILATION

Test Pit Number	Total Test Pit Depth (Ft.)	Thickness of Fill (Ft.)	Maximum Lead Concentration (PPM)
1	14.0	8.0	N/D
2	18.0	13.0	<.1
3	14.5	10.0	<.1
4	18.0	13.5	2.8
5	13.0	8.0	<.1
6	15.0	10.0	580.0
7	17.5	13.5	<.1
8	18.0	13.0	<.1
9	15.0	10.0	<.1
10	15.0	11.0	<.1
11	17.0	13.0	<.1
12	17.0	13.0	N/D
13	16.0	11.0	.4
14	11.0	7.0	.5
15	7.5	5.0	N/D
16	10.0	8.0	.2
17	6.0	2.0	<.1
18	10.0	6.5	N/D
19	10.0	4.5	.2

TABLE I (cont.)

TEST PIT DATA COMPILATION

Test Pit Number	Total Test Pit Depth (Ft.)	Thickness of Fill (Ft.)	Maximum Lead Concentration (PPM)
20	9.0	5.0	N/D
21	8.5	5.5	<.1
22	12.5	8.5	<.1
22A	10.0	6.0	<.1
24	8.0	3.0	N/D
24A	8.0	2.0	<.1
25	15.0	10.0	<.1
26	17.0	12.0	.3
28	7.0	1.0	.1
29	18.0	13.0	<.1
30	8.0	3.0	.4
31	8.0	4.0	<.1
32	6.5	3.5	<.1
33	13.0	9.0	<.1
G18	GRAB	----	.4
G21A	GRAB	----	<.1
G23	GRAB	----	<.1
G23A	GRAB	----	<.1

TABLE II

EP TOXICITY ANALYSES OF TEST PITS AT VARIOUS DEPTHS

Test Pit	Depth Interval	Pb ppm	As ppm	Hg ppm	Cd ppm	Cr ppm	Ag ppm	Ba ppm	Se ppm
TP-2,	1' - 2'	<.1	<.1						
TP-2,	18'	<.1	<.1						
TP-3,	1'	<.1	<.1						
TP-3,	14'	<.1	<.1						
TP-4,	0' - .5'	.3	<.1						
TP-4,	2.5'	2.8	<.1	<.01	.01	.25	<.01	<1	<.1
TP-4,	6.5'	.2	<.1						
TP-4,	11' - 13'	.3	<.1						
TP-4,	14'	<.1	<.1	<.01	<.01	.02	<.01	<1	<.1
TP-5,	1' - 2'	.4	<.1						
TP-5,	12' - 13'	<.1	<.1						
TP-6,	0' - .5'	580	<.1	<.1	.01	.03	<.01	<1	<.1
TP-6,	3'	.6	<.1						
TP-6,	6'	.1	<.1						
TP-6,	10.5'	.4	<.1						
TP-6,	15'	.1	<.1	<.01	<.01	.01	<.01	<1	<.01
TP-7,	1.5'	<.1	<.1						
TP-7,	17'	<.1	<.1						
TP-8,	2'	<.1	<.1						
TP-8,	7'	<.1	<.1						
TP-8,	17'	<.1	<.1						
TP-9,	2'	<.1	<.1						

TABLE II (cont.)

EP TOXICITY ANALYSES OF TEST PITS AT VARIOUS DEPTHS

Test Pit	Depth Interval	Pb ppm	As ppm	Hg ppm	Cd ppm	Cr ppm	Ag ppm	Ba ppm	Se ppm
TP-9,	9'	<.1	<.1						
TP-9,	15'	<.1	<.1	<.01	<.01	<.01	<.01	<1	<.1
TP-10,	1'	.4	<.1						
TP-10,	6'	<.1	<.1						
TP-10,	15'	<.1	<.1						
TP-11,	2' - 3'	<.1	<.1	<.01	<.01	<.01	<.01	<1	<.1
TP-11,	10' - 12'	<.1	<.1						
TP-11,	16' - 17'	<.1	<.1	<.01	<.01	<.01	<.01	<1	<.1
TP-13,	3' - 5'	<.1	<.1						
TP-13,	7' - 11'	.1	<.1						
TP-13,	15' - 16'	.4	<.1						
TP-14,	2' - 5'	<.1	<.1						
TP-14,	5' - 7'	.5	<.1						
TP-14,	9' - 10'	<.1	<.1						
TP-16,	1' - 5'	.2	<.1						
TP-17,	1' - 2'	<.1	<.1	<.01	<.01	<.01	<.01	<1	<.1
TP-19,	0' - 1.5'	.2	<.1						
TP-19,	8' - 9'	<.1	<.1						
TP-18,	0' - 2'	<.1	<.1						
TP-18,	1' - 1.5'	<.1	<.1						
TP-18,	8' - 10'	<.1	<.1						
TP-21,	0' - 1'	<.1	<.1	<.01	<.01	<.01	<.01	<1	<.1

TABLE II (cont.)

EP TOXICITY ANALYSES OF TEST PITS AT VARIOUS DEPTHS

Test Pit	Depth Interval	Pb ppm	As ppm	Hg ppm	Cd ppm	Cr ppm	Ag ppm	Ba ppm	Se ppm
TP-21,	7' - 9'	<.1	<.1						
TP-24,	0' - 1'	<.1	<,1						
TP-24,	7' - 8'	<.1	<.1						
TP-22,	10' - 12'	<.1	<.1						
TP-22A,	2' - 4'	<.1	<.1						
TP-24A,	0' - 1'	<.1	<.1						
TP-24A,	1' - 2'	<.1	<.1						
TP-25,	1' - 3'	<.1	<.1	<.01	<.01	<.01	<.01	<1	<.1
TP-25,	4.5' - 6'	<.1	<.1	<.01	<.01	<.01	<.01	<1	<.1
TP-25,	13' - 14'	<.1	<.1	<.01	<.01	<.01	<.01	<1	<.1
TP-26,	3' - 5'	.3	<.1						
TP-26,	16' - 17'	<.1	<.1						
TP-28,	0' - .5'	.1	<.1						
TP-28,	2' - 3'	<.1	<.1						
TP-28,	6' - 7'	<.1	<.1						
TP-29,	2' - 3'	<.1	<.1						
TP-29,	2' - 4'	<.1	<.1						
TP-29,	5' - 7'	<.1	<.1						
TP-29,	13' - 14'	<.1	<.1						
TP-30,	0' - 1'	.4	<.1						
TP-30,	7' - 8'	<.1	<.1						
TP-31,	0' - 1'	<.1	<.1						

TABLE II (cont.)

EP TOXICITY ANALYSES OF TEST PITS AT VARIOUS DEPTHS

Test Pit	Depth Interval	Pb ppm	As ppm	Hg ppm	Cd ppm	Cr ppm	Ag ppm	Ba ppm	Se ppm
TP-31,	6' - 7'	<.1	<.1						
TP-32,	1' - 1.5'	<.1	<.1						
TP-32,	2' - 3'	<.1	<.1						
TP-33,	2' - 4'	<.1	<.1						
TP-33,	9' - 11'	<.1	<.1						
G 18		.4	<.1						
G 21A		<.1	<.1						
G 23		<.1	<.1						
G 23A		<.1	<.1						

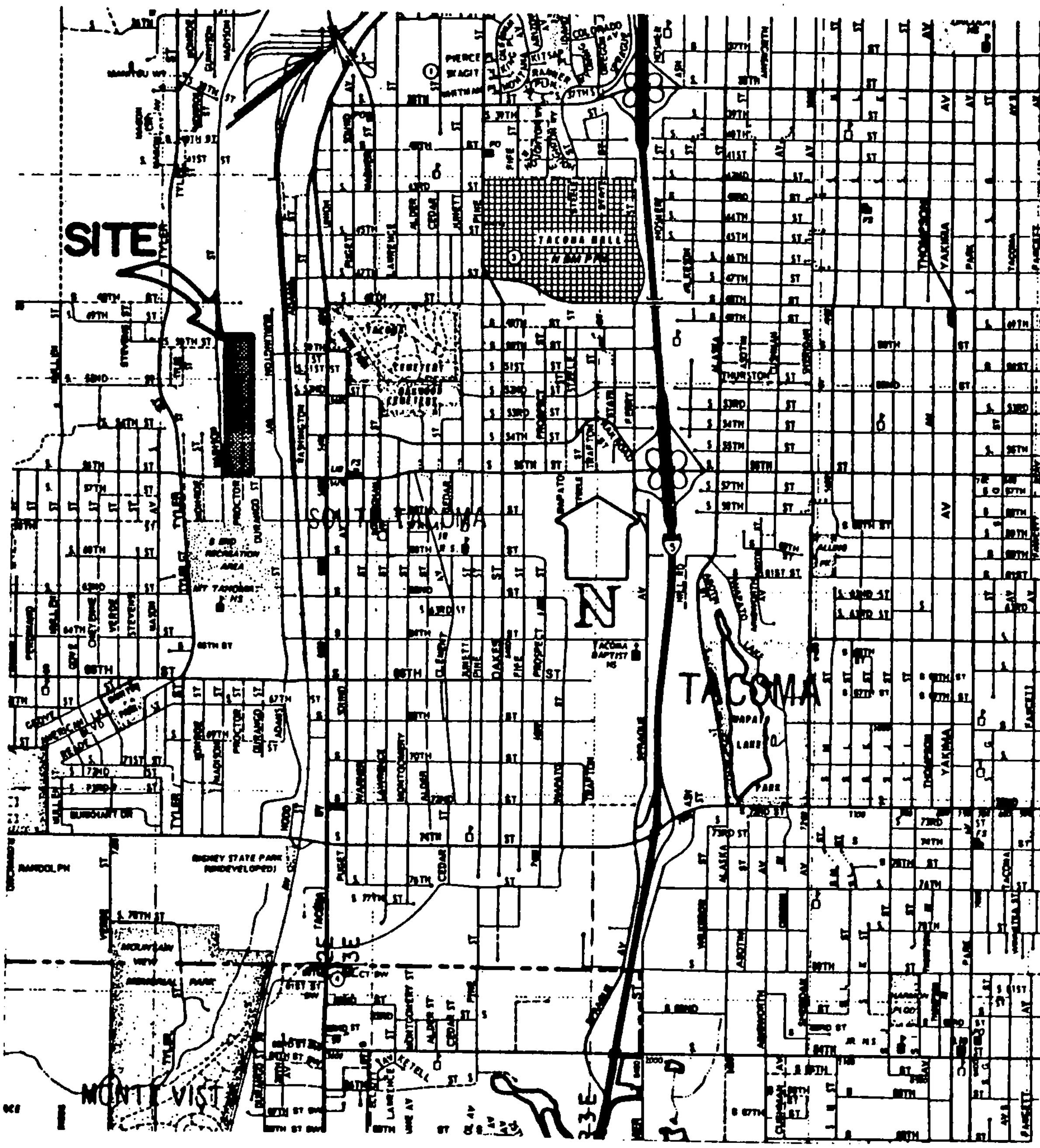
TABLE III

EP TOXICITY SUMMARY OF CHEMICAL ANALYSES

Test Pit	Depth Interval	PAH* (mg/g)	HH* (mg/g)	Oil and Grease (mg/g)
TP-24,	0' - 1'	<1	<.01	----
TP-22,	2' - 4'	<1	<.01	----
TP-24,	7' - 8'	<1	<.01	.064
G 23		<1	----	----
G 23A		<1	----	----
TP-24A,	0' - 1'	<1	----	----
TP-24A,	1' - 2'	--	<.01	----
TP-28,	0' - .5'	<1	<.01	1.43
TP-28,	2' - 3'	<1	<.01	----
TP-28,	6' - 7'	<1	<.01	0.29
TP-31,	0' - 1'	<1	<.01	----
TP-31,	6' - 7'	<1	<.01	----
TP-32,	1' - 1.5'	<1	<.01	----
TP-32,	4.5' - 5.5'	<1	<.01	----
TP-33,	2' - 4'	<1	<.01	----
TP-33,	9' - 11'	<1	<.01	----

*PAH - Polycyclic Aromatic Hydrocarbons

*HH - Halogenated Hydrocarbons



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Vicinity Map
Anderson Enterprises Property
Tacoma, Washington

Proj. No. 2560	Date Mar. '85	Plate 1

MAJOR DIVISIONS			GRAPH SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTION
Coarse Grained Soils	Gravel And Gravelly Soils	Clean Gravels (little or no fines)		GW gw	Well-Graded Gravels, Gravel-Sand Mixtures, Little Or No Fines
				GP gp	Poorly-Graded Gravels, Gravel-Sand Mixtures, Little Or No Fines
	More Than 50% Coarse Fraction Retained On No. 4 Sieve	Gravels With Fines (appreciable amount of fines)		GM gm	Silty Gravels, Gravel-Sand-Silt Mixtures
				GC gc	Clayey Gravels, Gravel-Sand-Clay Mixtures
More Than 50% Material Larger Than No. 200 Sieve Size	Sand And Sandy Soils	Clean Sand (little or no fines)		SW sw	Well-Graded Sands, Gravelly Sands, Little Or No Fines
				SP sp	Poorly-Graded Sands, Gravelly Sands, Little Or No Fines
	More Than 50% Coarse Fraction Passing No. 4 Sieve	Sands With Fines (appreciable amount of fines)		SM sm	Silty Sands, Sand-Silt Mixtures
				SC sc	Clayey Sands, Sand-Clay Mixtures
Fine Grained Soils	Silts And Clays	Liquid Limit Less Than 50		ML ml	Inorganic Silts & Very Fine Sands, Rock Flour, Silty-Clayey Fine Sands; Clayey Silts w/ Slight Plasticity
				CL cl	Inorganic Clays Of Low To Medium Plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean
				OL ol	Organic Silts And Organic Silty Clays Of Low Plasticity
More Than 50% Material Smaller Than No. 200 Sieve Size	Silts And Clays	Liquid Limit Greater Than 50		MH mh	Inorganic Silts, Micaceous Or Diatomaceous Fine Sand Or Silty Soils
				CH ch	Inorganic Clays Of High Plasticity, Fat Clays
				OH oh	Organic Clays Of Medium To High Plasticity, Organic Silts
Highly Organic Soils				PT pt	Peat, Humus, Swamp Soils With High Organic Contents

Topsoil		Humus And Duff Layer
Fill		Highly Variable Constituents

The Discussion In The Text Of This Report Is Necessary For A Proper Understanding Of The Nature Of The Material Presented In The Attached Logs

Notes :
Dual symbols are used to indicate borderline soil classification. Upper case letter symbols designate sample classifications based upon laboratory testing; lower case letter symbols designate classifications not verified by laboratory testing.

I	2" O.D. SPLIT SPOON SAMPLER	C	TORVANE READING, tsf
II	2.4" I.D. RING SAMPLER OR SHELBY TUBE SAMPLER	qu	PENETROMETER READING, tsf
P	SAMPLER PUSHED	W	MOISTURE, percent of dry weight
*	SAMPLE NOT RECOVERED	pcf	DRY DENSITY, pounds per cubic ft.
∇	WATER LEVEL (DATE)	LL	LIQUID LIMIT, percent
	WATER OBSERVATION WELL	PI	PLASTIC INDEX

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LEGEND

Proj. No. 2560 | Date Mar.'85 | Plate 4

TEST PIT NO. 1

Logged By SB

Date 2/18/85

Elev. 264±

Depth (ft.)	USCS	Soil Description	W (%)
0		angular slag up to 18" nominal diameter, insignificant fines	
5		@5-6' apparent "welded" zone-perhaps placed hot and molten	

10	sp sm	light brown SAND with silt (no apparent dip to strata)	
		becomes tan with light brown mottling	
15		Test Pit terminated at 14' below existing grade. No groundwater seepage encountered during excavation.	
20			

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TEST PIT LOGS

ANDERSON ENTERPRISES PROPERTY
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TEST PIT NO. 2

Logged By SB

Date 2/18/85

Elev. 263±

Depth (ft.)	USCS	Soil Description	W (%)	
0		dark gray-black silty fine SAND with 25-35% "slag" pieces, moist cinder lense at 3' becomes 70-80% slag with up to 8" nominal diameter refractory brick at 5' (roots to 9')		<.1 ppm lead
5				
10				
15	sp sm	light tan with orange mottling fine SAND with silt, moist		<.1ppm lead
20		Test Pit terminated at 18' below existing grade. No groundwater seepage encountered during excavation.		

Note-Lead concentrations per EP Toxicity evaluation by Bennett Laboratories

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TEST PIT NO. 3

Logged By SB
Date 2/19/85

Elev. 264±

Depth (ft.)	USCS	Soil Description	W (%)	
0		brown silty SAND with roots		<.1 ppm lead
	35°	black-dark gray metallic luster "SAND" grain size		
		cinder layer with refractory bricks (roots to 3')		
5		dark brown to black silty SAND with 50-60% slag pieces ranging from 2-3" up to 6" nominal diameter		
		2-3" angular slag with little to no fines		
10	20°			
	sp sm	light brown SAND, fine with silt		
		becomes tan with brown mottling		<.1 ppm lead
15		Test Pit terminated at 14.5' below existing grade. No groundwater seepage encountered during excavation.		
20				

NOTE: Lead concentrations per EP Toxicity evaluation by Bennet Laboratories.

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Proj. No. 2560 **Date** Mar.'85 **Plate** 7

TEST PIT NO. 4

Logged By SB

Date 2/18/85

Elev. 262±

Depth (ft.)	USCS	Soil Description	W (%)	
0		light brown silty gravelly SAND with lumber debris		.3 ppm lead
		black with some iron staining, silty SAND with 40-50% slag exhibiting some cementation and minor scrap metal, zones of increasing % slag to 70% @ 1.5-3' and 6-7.5'		2.8ppm lead
5		minor isolated zone of FeO_2 staining @ 18° W		.2 ppm lead
		(roots to 9.5')		
10		black "slag" up to 18" nominal diameter with little or no fines		.3 ppm lead
		black silty SAND with trace small slag fragments		<.1 ppm lead
15	sm	tan with orange mottling SAND, fine with silt, moist		
		decreased mottling		
20		Test Pit terminated at 18' below existing grade. No groundwater seepage encountered during excavation.		

NOTE: Lead concentrations per EP Toxicity evaluation by Bennet Laboratories

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TEST PIT LOGS

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TEST PIT NO. 5

Logged By SB

Date 2/18/85

Elev. 263±

Depth (ft.)	USCS	Soil Description	W (%)	
0	30°	dark brown SAND with silt, 30-40% slag, wood fragments, gravel		.4 ppm lead
		scattered refractory bricks @ 3-4' predominately and isolated to 7'		
5	10°	slag-angular ranging to 8" nominal diameter, some dark brown sandy lenses comprising < 15% by weight, some copper stained pieces-isolated		
		black SAND with silt < 5% slag		
		light brown SAND with silt		
10	sp sm	becomes tan at 9.5'		<.1 ppm lead
15		Test Pit terminated at 13' below existing grade. No groundwater seepage encountered during excavation.		

NOTE: Lead concentrations per EP Toxicity evaluation by Bennett Laboratories

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TACOMA, WASHINGTON

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TEST PIT NO. 6

Logged By SB

Date 2/18/85

Elev. 261±

Depth (ft.)	USCS	Soil Description	W (%)	
0		dark gray silty SAND with <10% slag, moist		580 ppm lead
	20°	dark brown/black silty SAND with 40-50% slag, moist, exhibiting slight to medium cementation		.6 ppm lead
5		slag up to 20" nominal diameter		
		scattered refractory brick from 6-7'		.1 ppm lead
		90% slag with fines comprised of slag debris		
10	sp	tan/brown mottled SAND		.4 ppm lead
		decreased mottling at 13'		.1 ppm lead
15				

Test Pit terminated at 15' below existing grade. No groundwater seepage encountered during excavation.

20

NOTE: Lead concentrations per EP Toxicity evaluation by Bennett Laboratories

TEST PIT NO. 7

Logged By SB
Date 2/19/85

Elev. 264±

Depth (ft.)	USCS	Soil Description	W (%)	
0	20°	black iron-stained SAND with 60-70% slag (partially welded), with isolated brick fragments		<.1 ppm lead
	25°	black silty SAND very hard layer (minor steel cuttings)		
5		black iron-stained slag (85-90%), with black sand, isolated brick fragments and cinder lenses		
		lense of black SAND with 5-60% slag		
10	10°	black glassy slag up to 18" nominal diameter, some olive coloration, little or no fines		
15	sp sm	light brown SAND with silt, becomes light tan with slight mottling		<.1 ppm lead
20		Test Pit terminated at 17.5' below existing grade. No groundwater seepage encountered during excavation.		

NOTE: Lead concentrations per EP Toxicity evaluation by Bennett Laboratories

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TEST PIT LOGS
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Proj. No. 2560 | Date Mar. '85 | Plate 11

TEST PIT NO. 8

Logged By SB

Date 2/18/85

Elev. 262±

Depth (ft.)	USCS	Soil Description	W (%)	
0		black iron-stained coarse SAND, moist, isolated lumber debris with 40-50% slag		< .1 ppm lead
5				< .1 ppm lead
	20°	scattered refractory bricks at 8-9'		
10		black slag with little or no fine matrix, slag sizes range to 18" nominal diameter		
15	sp sm	tan/light brown mottled SAND, fine with silt, moist becomes light tan in color and decreased mottling		< .1 ppm lead
20		Test Pit terminated at 18' below existing grade. No groundwater seepage encountered during excavation.		

NOTE: Lead concentrations per EP Toxicity evaluation by Bennett Laboratories

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TEST PIT LOGS
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Proj. No. 2560	Date Mar.'85	Plate 12

TEST PIT NO. 9

Logged By SB

Date 2/18/85

Elev. 260±

Depth (ft.)	USCS	Soil Description	W (%)	
0		tan silty gravelly SAND, moist, loose		
		black SAND with some slag, moist, trace organic (wood) fragments		<.1 ppm lead
5		black/brown SAND, fine, with 30% slag pieces <4" diameter, minor iron stained zones		
	25°	70-80% black slag with black sand matrix, well "cemented"		<.1 ppm lead
10	sp sm	light tan mottled SAND with silt, fine, moist becomes lighter tan		<.1 ppm lead
15		Test Pit terminated at 15' below existing grade. No groundwater seepage encountered during excavation.		
20				

NOTE: Lead concentrations per EP Toxicity evaluation by Bennett Laboratories

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TEST PIT NO. 10

Logged By SB

Date 2/18/85

Elev. 261±

Depth (ft.)	USCS	Soil Description	W (%)	
0		dark brown iron stained silty SAND with 35-40% slag/gravel		.4 ppm lead
		predominately slag up to 12" diameter with little or no fines		
5		dark gray/black SAND with silt and 15-20% slag		
		slag increases to 70-75% with some fine matrix		<.1 ppm lead
10				
	sp sm	light brown SAND with silt, moist		
		becomes tan		<.1 ppm lead
15		Test Pit terminated at 15' below existing grade. No groundwater seepage encountered during excavation.		
20				

NOTE: Lead concentrations per EP Toxicity evaluation by Bennett Laboratories

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TEST PIT LOGS

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Proj. No.	Date	Plate
2560	Mar.'85	14

TEST PIT NO. 11

Logged By SB

Date 2/19/85

Elev. 263±

Depth (ft.)	USCS	Soil Description	W (%)	
0		dark brown gravelly silty SAND, fine with scattered organics		
	30°			<.1 ppm lead
		black silty SAND with 70-80% slag up to 18" diameter, and bricks		
5		dark brown/black silty SAND with 40% slag up to 4" and scattered refractory brick		
	25°			<.1 ppm lead
10		becomes more black in color, isolated branches		
	10°			
	sp sm	light brown SAND with silt, moist		
15		becomes tan with minor light brown mottling		<.1 ppm lead
20		Test Pit terminated at 17' below existing grade. No groundwater seepage encountered during excavation.		

NOTE: Lead concentrations per EP Toxicity evaluation by Bennett Laboratories

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TEST PIT LOGS

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TEST PIT NO. 12

Logged By SB

Date 2/19/85

Elev. 263±

Depth (ft.)	USCS	Soil Description	W (%)	
0		brown iron stained SAND with silt, 40-50% slag and scattered refractory bricks		
	30°			
5		black SAND, fine to medium, with metallic luster, 10-15% slag < 4" nominal diameter		
	30°	brown iron stained SAND with 60-70% slag up to 12" nominal diameter		
10		light brown iron stained gravelly SAND with silt, scattered refractory bricks, slag, scrap iron		
	5°			
15	sp sm	light brown SAND with silt, becomes tan at 14.5'		
	gp	becomes tan sandy GRAVEL		
20		Test Pit terminated at 17' below existing grade. No groundwater seepage encountered during excavation.		

NOTE: Lead concentrations per EP Toxicity evaluation by Bennett Laboratories

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TEST PIT LOGS

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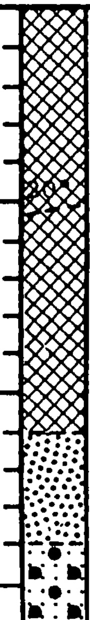
Proj. No.	Date	Plate
2560	Mar.'85	16

TEST PIT NO. 13

Logged By SB
Date 2/19/85

Elev. 261±



Depth (ft.)	USCS	Soil Description	W (%)	
0–5		dark brown iron stained fine SAND matrix in 80% slag ranging from 2" to 6" nominal diameter		<.1 ppm lead
5	20°			
5–11		black fine SAND matrix in 95% slag up to 18" nominal diameter (no apparent bedding)		.1 ppm lead
11–14	sp	light brown SAND, fine		
14–16	gp	tan sandy GRAVEL		.4 ppm lead

Test Pit terminated at 16' below existing grade. No groundwater seepage encountered during excavation.

NOTE: Lead concentrations per EP Toxicity evaluation by Bennett Laboratories

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TEST PIT LOGS

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TEST PIT NO. 14

Logged By SB

Date 2/19/85

Elev. 264±

Depth (ft.)	USCS	Soil Description	W (%)	
0		dark brown/black gravelly SAND with 15-20% slag, moist		
		gray silty SAND with 30-40% slag, red building bricks, concrete footing pad (flat lying contact)		<.1 ppm lead
5		dark brown silty gravelly SAND, fine (may be original topsoil?)		.5 ppm lead
	gp	tan/orange mottled sandy GRAVEL, fine to medium		
10		becomes grayish at 9'		<.1 ppm lead

Test Pit terminated at 11' below existing grade. No groundwater seepage encountered during excavation.

NOTE: Lead concentrations per EP Toxicity evaluation by Benhett Laboratories

15

Logged By SB

Date 2/20/85

TEST PIT NO. 15

Elev. 262±

Depth (ft.)	USCS	Soil Description	W (%)	
0		gray/brown silty SAND, very fine to fine, with gravels,minor gray lenses(insignificant inclination)		
		dark brown gravelly silty SAND, fine, with roots		
5	gp	tan w/light orange mottling sandy GRAVEL		

Test Pit terminated at 7.5' below existing grade. No groundwater seepage encountered during excavation.

10

NOTE: Lead concentrations per EP Toxicity evaluation by Bennett Laboratories

15

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TEST PIT LOGS

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TEST PIT NO. 16

Logged By SB

Date 2/20/85

Elev. 262±

Depth (ft.)	USCS	Soil Description	W (%)	
0		isolated slag encountered at 1.5'		.2 ppm lead
		interbedded light brown/tan silty SAND (predominate) with black sand, fine		
5		significant (4") thick lenses black sand at 2.5' and 5'		
	gp	tan with light orange mottling sandy GRAVEL		
10				

Test Pit terminated at 10' below existing grade. No groundwater seepage encountered during excavation.

NOTE: Lead concentrations per EP Toxicity evaluation by Bennett Laboratories

15

Logged By SB

Date 2/20/85

TEST PIT NO. 17

Elev. 252±

Depth (ft.)	USCS	Soil Description	W (%)	
0		dark brown silty SAND, fine with trace gravel, abundant organic fragments, moist		<.1 ppm lead
	sp sm	tan with orange mottling fine SAND with silt, moist		
5				

Test Pit terminated at 6' below existing grade. No groundwater seepage encountered during excavation.

NOTE: Lead concentrations per EP Toxicity evaluation by Bennett Laboratories

10

15

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TEST PIT LOGS

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TEST PIT NO. 18

Logged By SB

Date 2/21/85

Elev. 267±

Depth (ft.)	USCS	Soil Description	W (%)	
0		light brown SAND, fine with gravel		<.1 ppm lead
		dark gray/black SAND lense from 1-1.5'		
		brown/gray SAND matrix with 80-90% slag/ refractory brick		
5		dark brown silty sandy GRAVEL, fine		
	sp	tan/light orange mottled gravelly SAND, coarse		<.1 ppm lead
		becomes grayish @8'		
10				

Test Pit terminated at 10' below existing grade. No groundwater seepage encountered during excavation.

NOTE: Lead concentrations per EP Toxicity evaluation by Bennett Laboratories

15

TEST PIT NO. 19

Logged By SB

Date 2/21/85

Elev. 267±

Depth (ft.)	USCS	Soil Description	W (%)	
0		dark brown silty SAND with 60-70% slag, refractory brick in lenses at 1-1.5' and 2.5-3.5'		.2 ppm lead
		dark brown/gray silty SAND with slag and brick as described above		
5	gp	tan/orange mottled sandy GRAVEL, fine to medium, decreased mottling below 5.5'		<.1 ppm lead
10				

Test Pit terminated at 10' below existing grade. No groundwater seepage encountered during excavation.

NOTE: Lead concentrations per EP Toxicity evaluation by Bennett Laboratories

15

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TEST PIT LOGS

ANDERSON ENTERPRISES PROPERTY
TACOMA, WASHINGTON

Proj. No. 2560	Date Mar.'85	Plate 20

TEST PIT NO. 20

Logged By SB

Date 2/21/85

Elev. 265±

Depth (ft.)	USCS	Soil Description	W (%)	
0		dark brown/black iron stained SAND with 80-90% slag, refractory brick		
		dark brown silty sandy GRAVEL, moist (possible native contact at 3')		
5	gp	tan/orange mottled sandy GRAVEL, fine		
		becomes grayish		
10		Test Pit terminated at 9' below existing grade. No groundwater seepage encountered during excavation.		
15				

TEST PIT NO. 21

Logged By SB

Date 2/21/85

Elev. 266±

Depth (ft.)	USCS	Soil Description	W (%)	
0		dark brown silty gravelly SAND, moist		<.1 ppm lead
		80-90% slab-black/olive with iron stains (some vesicular and ropet pieces), refractory bricks and black iron stained fines		
5		dark brown/black silty sandy GRAVEL, moist		
	gp	tan/orange mottled sandy GRAVEL, fine		<.1 ppm lead
		becomes light gray/tan at 7'		
10		Test Pit terminated at 8.5' below existing grade. No groundwater seepage encountered during excavation.		
		NOTE: Lead concentrations per EP Toxicity evaluation by Bennett Laboratories		
15				

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TEST PIT LOGS
ANDERSON ENTERPRISES PROPERTY
TACOMA, WASHINGTON

Proj. No. 2560 | Date Mar.'85 | Plate 21

TEST PIT NO. 22

Logged By SB
Date 2/21/85

Elev. 268±

Depth (ft.)	USCS	Soil Description	W (%)	
0–4.5		dark gray/black SAND with iron stains, slag "pockets" comprising 20-30%		
4.5	====	black "tar" zone w/gravels, tar paper, wood fragments		
5–7		interbedded dark gray and brown SAND, fine		
7–8.5		dark brown/black silty sandy GRAVEL, moist		
8.5–12.5	gp	orange mottled sandy GRAVEL, wet, becomes grayish at 10.5'		<.1 ppm lead

Test Pit terminated at 12.5' below existing grade. No groundwater seepage encountered during excavation.

TEST PIT NO. 22A

Logged By SB
Date 2/21/85

Elev. 265±

Depth (ft.)	USCS	Soil Description	W (%)	
0–1.5		dark brown/gray iron stained SAND, fine, with 20% slag		<.1 ppm lead
1.5–4		80-90% slag with refractory brick and brown sandy fines		<.1 ppm lead
4–6		dark brown silty gravelly SAND, fine, moist (appears native-topsoil?)		
6–10	gp	tan/orange mottled sandy GRAVEL, fine, slight mottling below 7.5'		

Test Pit terminated at 10' below existing grade. No groundwater seepage encountered during excavation.

NOTE: Lead concentrations per EP Toxicity evaluation by Bennett Laboratories

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TEST PIT LOGS
ANDERSON ENTERPRISES PROPERTY
TACOMA, WASHINGTON

Proj. No. 2560	Date Mar.'85	Plate 22

TEST PIT NO. 23

Logged By

Date

Elev.

Depth (ft.)	USCS	Soil Description	W (%)	
0–15		GRAB SAMPLE IN SHED		

Logged By SB

Date 2/21/85

TEST PIT NO. 24

Elev. 264±

Depth (ft.)	USCS	Soil Description	W (%)	
0	sm	black silty gravelly SAND to sandy GRAVEL with silt, high petro. base (?) content, moist to wet		<.1 ppm lead
5	gp	light orange mottled sandy GRAVEL, fine, moist, becomes tan to grayish at 4.5'		<.1 ppm lead

Test Pit terminated at 8' below existing grade. No groundwater seepage encountered during excavation.

NOTE: Lead concentrations per EP Toxicity evaluation by Bennett Laboratories

Depth scale (ft.): 0, 5, 10, 15

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TEST PIT LOGS
ANDERSON ENTERPRISES PROPERTY
TACOMA, WASHINGTON

Proj. No. 2560	Date Mar.'85	Plate 23

TEST PIT NO. 24A

Logged By SB

Date 2/21/85

Elev. 264±

Depth (ft.)	USCS	Soil Description	W (%)	
0	sm	black silty gravelly SAND, moist becomes dark brown at 1'		< .1 ppm lead < .1 ppm lead
5	gp	tan/orange mottled sandy GRAVEL, moist, becomes grayish at 4'		

Test Pit terminated at 8' below existing grade. No groundwater seepage encountered during excavation.

NOTE: Lead concentrations per EP Toxicity evaluation by Bennett Laboratories

10

15

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TEST PIT LOGS

ANDERSON ENTERPRISES PROPERTY
TACOMA, WASHINGTON

Proj. No.	Date	Plate
2560	Mar.'85	24

TEST PIT NO. 25

Logged By SB

Date 2/20/85

Elev. 264±

Depth (ft.)	USCS	Soil Description	W (%)	
0	25-30%	brown silty SAND, fine with 30-40% slag (contains white granular material, precipitation?)		<.1 ppm lead
5		(lense of gray fine slag, coarse sand size on east pit wall)		<.1 ppm lead
		brown SAND with coarse slag fragments and increasing slag from 2-6" nominal diameter		
		black siliceous slag and refractory bricks with ≤10% fines		
10	sp sm	dark brown gravelly SAND with silt		
	gp	tan with slight orange mottling sandy GRAVEL		<.1 ppm lead
15		Test Pit terminated at 15' below existing grade. No groundwater seepage encountered during excavation.		
20				

NOTE: Lead concentrations per EP Toxicity evaluation by Bennett Laboratories

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TEST PIT LOGS

ANDERSON ENTERPRISES PROPERTY
TACOMA, WASHINGTON

Proj. No. 2560 | Date Mar.'85 | Plate 25

TEST PIT NO. 26

Logged By SB

Date 2/20/85

Elev. 264±

Depth (ft.)	USCS	Soil Description	W (%)	
0	35°	85-90% black slag (siliceous) with black/brown sandy fines		
		light brown iron stained silty SAND with 20-40% slag, refractory bricks		.3 ppm lead
5		black/olive siliceous slag, no fines		
10	10°			
	sm	brown silty SAND, fine, moist		
	sp-sm	light brown SAND, fine, with silt, moist		
15	gp	tan with light orange mottling sandy gRAVEL		<.1 ppm lead
20		Test Pit terminated at 17' below existing grade. No groundwater seepage encountered during excavation.		

NOTE: Lead concentrations per EP Toxicity evaluation by Bennett Laboratories

Earth Consultants Inc.
GEOTECHNICAL ENGINEERING & GEOLOGY

TEST PIT LOGS

ANDERSON ENTERPRISES PROPERTY
TACOMA, WASHINGTON

Proj. No.	Date	Plate
2560	Mar.'85	26

TEST PIT NO. 27

Logged By ______

Date ______

Elev. ______

Depth (ft.)	USCS	Soil Description	W (%)	
0–15		Location 27 was deleted because of utilities east of building.		

Logged By SB

Date 2/21/85

TEST PIT NO. 28

Elev. 264±

Depth (ft.)	USCS	Soil Description	W (%)	
0	sm	black gravelly silty SAND with "oil" sheen & odor		.1 ppm lead
	sm	dark brown silty gravelly SAND, moist		<.1 ppm lead
5	gp	tan/orange mottled sandy GRAVEL, moist		
		becomes grayish @5.5'		<.1 ppm lead

Test Pit terminated at 7' below existing grade. No groundwater seepage encountered during excavation.

NOTE: Lead concentrations per EP Toxicity evaluation by Bennett Laboratories

Earth Consultants Inc.
GEOTECHNICAL ENGINEERING & GEOLOGY

TEST PIT LOGS

ANDERSON ENTERPRISES PROPERTY
TACOMA, WASHINGTON

Proj. No.	Date	Plate
2560	Mar.'85	27

TEST PIT NO. 29

Logged By SB

Date 2/20/85

Elev. 264±

Depth (ft.)	USCS	Soil Description	W (%)	
0		dark brown iron stained SAND and coarse slag, with 70-80% slag, black with iron staining, vesicular, some siliceous material		<.1 ppm lead <.1 ppm lead
5		scattered refractory bricks		<.1 ppm lead
10		brown/olive silty SAND, fine, moist		
		black SAND, fine, moist (metallic luster to some grains)		<.1 ppm lead
15	sp sm	light brown SAND with silt, moist becomes tan with brown mottling		
20		Test Pit terminated at 18' below existing grade. No groundwater seepage encountered during excavation.		

NOTE: Lead concentrations per EP Toxicity evaluation by Bennett Laboratories

Earth Consultants Inc.
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TEST PIT LOGS
ANDERSON ENTERPRISES PROPERTY
TACOMA, WASHINGTON

Proj. No. 2560 | Date Mar.'85 | Plate 28

TEST PIT NO. 30

Logged By SB

Date 2/21/85

Elev. 265±

Depth (ft.)	USCS	Soil Description	W (%)	
0		black SAND with silt, moist (FILL)		.4 ppm lead
	sm	dark brown silty gravelly SAND, fine, moist		
	gp gm	tan/orange mottled sandy GRAVEL with silt, moist		
5	gp gm	becomes tan with slight mottling at 4'		<.1 ppm lead

Test Pit terminated at 8' below existing grade. No groundwater seepage encountered during excavation.

NOTE: Lead concentrations per EP Toxicity evaluation by Bennett Laboratories

(Depth scale: 0, 5, 10, 15)

Logged By SB

Date 2/21/85

TEST PIT NO. 31

Elev. 265±

Depth (ft.)	USCS	Soil Description	W (%)	
0		dark brown silty SAND with trace gravel (FILL)		<.1 ppm lead
		(pocket of slag from 1-3' at east end of pit) brown silty gravelly SAND, fine to medium		
5	gp	tan/slight orange mottling sandy fine GRAVEL		
		becomes grayish at 6'		<.1 ppm lead

Test Pit terminated at 8' below existing grade. No groundwater seepage encountered during excavation.

NOTE: Lead concentrations per EP Toxicity evaluation by Bennett Laboratories

(Depth scale: 0, 5, 10, 15)

Earth Consultants Inc.
GEOTECHNICAL ENGINEERING & GEOLOGY

TEST PIT LOGS
ANDERSON ENTERPRISES PROPERTY
TACOMA, WASHINGTON

Proj. No. 2560 | **Date** Mar. '85 | **Plate** 29

TEST PIT NO. 32

Logged By SB
Date 2/21/85

Elev. 264±

Depth (ft.)	USCS	Soil Description	W (%)	
0		brown gravelly SAND with silt		<.1 ppm lead
		black/dark gray SAND with metallic luster		
		dark brown silty gravelly SAND		<.1 ppm lead
5	gp	tan SAND grading to tan/gray sandy GRAVEL, fine		

Test Pit terminated at 6.5' below existing grade. No groundwater seepage encountered during excavation.

NOTE: Lead concentrations per EP Toxicity evaluation by Bennett Laboratories

TEST PIT NO. 33

Logged By SB
Date 2/21/85

Elev. 263±

Depth (ft.)	USCS	Soil Description	W (%)	
0		brown silty SAND with gravel		<.1 ppm lead
5		building bricks, steel cable, sheet metal very loose, caved significantly		
	30°	dark brown/black fine SAND, metallic luster		
10	sp	tan/orange mottled gravelly SAND		<.1 ppm lead

Test Pit terminated at 13' below existing grade. No groundwater seepage encountered during excavation.

Earth Consultants Inc.
GEOTECHNICAL ENGINEERING & GEOLOGY

TEST PIT LOGS

ANDERSON ENTERPRISES PROPERTY
TACOMA, WASHINGTON

Proj. No. 2560 | Date Mar.'85 | Plate 30

APPENDIX N

BLACK AND VEATCH
MEMORANDUMS TO WDOE - 1985

MEMORANDUM

To: File

From: T. L. Rutherford

Subject: South Tacoma Swamp Sampling

B&V Project 11889.600
June 26, 1985

Monitoring wells at the South Tacoma Swamp site, which were installed in 1982 during a preliminary site investigation conducted by B&V for EPA, were redeveloped and sampled during the period of June 19 through June 21. The activities conducted each day are described below.

June 19

Mark Snyder and Tom Rutherford of B&V, Fred Gardner of WDOE, and Russ Pryor and Tim Flynn of Hart-Crowser met about 11:30 a.m. near the South Tacoma Swamp site. Much of the time was spent trying to locate all of the wells. Well CBS-13, the 4 inch diameter and deep monitoring well, was found to have been broken into and filled with rocks. The lock and hasp on CBS-06, which is immediately south of CBS-13, had also been broken off but the well was still intact. Wells CBS-06 and CBS-12 were developed by pumping for approximately 1 hour each. Wells CBS-05, CBS-03, CBS-09, and CBS-10 were developed by removing approximately 40 bailer volumes from each well using the dedicated bailers. Well CBS-07 was bailed until dry - approximately 5 bailer volumes. It was not determined if there was sufficient length of rope on this bailer to reach the bottom of the well. None of the locks could be opened by the keys provided, therefore, locks were cut off and replaced.

June 20

Tom Rutherford of B&V and Phil Spadero, Russ Pryor and Tim Flynn of Hart-Crowser met near the site about 10:00 a.m. and began taking water samples. Three casing volumes of water were removed by bailing before sampling each well. Samples were collected for extractable organics (1 gal. jar), volatile organics (2 - 40 mil. viles), and metals analyses. The metal samples were screened and preserved using HNO_3. Water level was read for each well prior to bailing. The temperature, pH, and specific conductivity of the water sample was measured and recorded for each well. Logs were maintained of time and all other field measurements by Hart-Crowser. Doug Pierce from TPCHD came by to help find wells that had not be located. He showed us the location of well CBS-01 but we were unable to find either CBS-08 or CBS-11. It is possible that these two wells have been covered by piles of fill. Wells CBS-01, CBS-02, and CBS-04 were developed by removing approximately 40 bailer volumes full of water. Samples taken (in order of completion) were CBS-10, CBS-04, CBS-02, CBS-01, CBS-12, CBS-03, CBS-06, and CBS-05. A duplicate sample was collected at CBS-05.

June 21

Hart-Crowser crew of Phil Spadero and Tim Flynn finished sampling wells. Sampled CBS-09 (including duplicate). CBS-07, and Railroad well were not

MEMORANDUM

sampled. CBS-07 was purged dry, no recharge. Railroad well water level was low, volume of well high, thus sampling could not be accomplished with equipment on hand. Sampling of Railroad well will be delayed until sampling of monitoring wells at Tacoma Landfill is accomplished.

TLR:kc

cc: Fred Gardner, WDOE

BLACK & VEATCH

MEMORANDUM

Washington Department of Ecology
South Tacoma Swamp
Work Assignment No. 1

B&V Project 11889.600
June 28, 1985

To: Distribution

From: T. L. Rutherford

Subject: Initial Background Investigation - South Tacoma Swamp

This memo summarizes the work efforts expanded to date on the initial background investigation of the South Tacoma Swamp. These efforts, which are discussed below, include:

- o Meetings with WDOE and TPCHD.
- o Review of B&V project files.
- o Sampling of existing monitoring wells.

B&V met with WDOE to discuss objectives of the South Tacoma Swamp investigation and to obtain possible sources of information on the site.

B&V met with TCPHD to discuss the site. Doug Pierce of TPCHD provided a report, "South Tacoma Industrial Waste Survey", by himself and Steve Rogers of TPCHD dated 1982. The report discusses the history of the development in the South Tacoma area and presents the findings of a door-to-door survey of waste management practices of firms in the area which have petroleum products or chemicals which, if improperly disposed of, could adversely effect Tacoma's water supply.

B&V conducted a preliminary site investigation of the South Tacoma Swamp under EPA Contract 68-03-1614 in 1982. The objectives of this investigation were to define the potentiometric surface for the area, to perform a magnetometer survey in areas designated by EPA Region 10, and to obtain for analyses samples of surface water, groundwater, surface soil, and subsurface soil at selected locations. Evaluation and interpretation of data collected during the field investigation was to be accomplished by others as directed by EPA.

Figure 1 shows the locations of monitoring wells installed during the investigation and the location of sampling points and magnetometer survey areas. The project files for this investigation and the B&V investigation at Tacoma Well No. 12A were reviewed to determine the site background information collected.

B&V project files for the Remedial Investigation of Tacoma Landfill also contain data and reports of interest to the South Tacoma Swamp investigation. Included in these materials are the Brown & Caldwell Clover/Chambers Creek Geohydrologic Study and the EPA Field Investigation and Feasibility Study report for South Tacoma Channel, Well 12A. Historical aerial photos obtained

MEMORANDUM

from EPA for Tacoma Landfill also showed portions of the South Tacoma Swamp site. These photos have been returned to EPA but will be borrowed again.

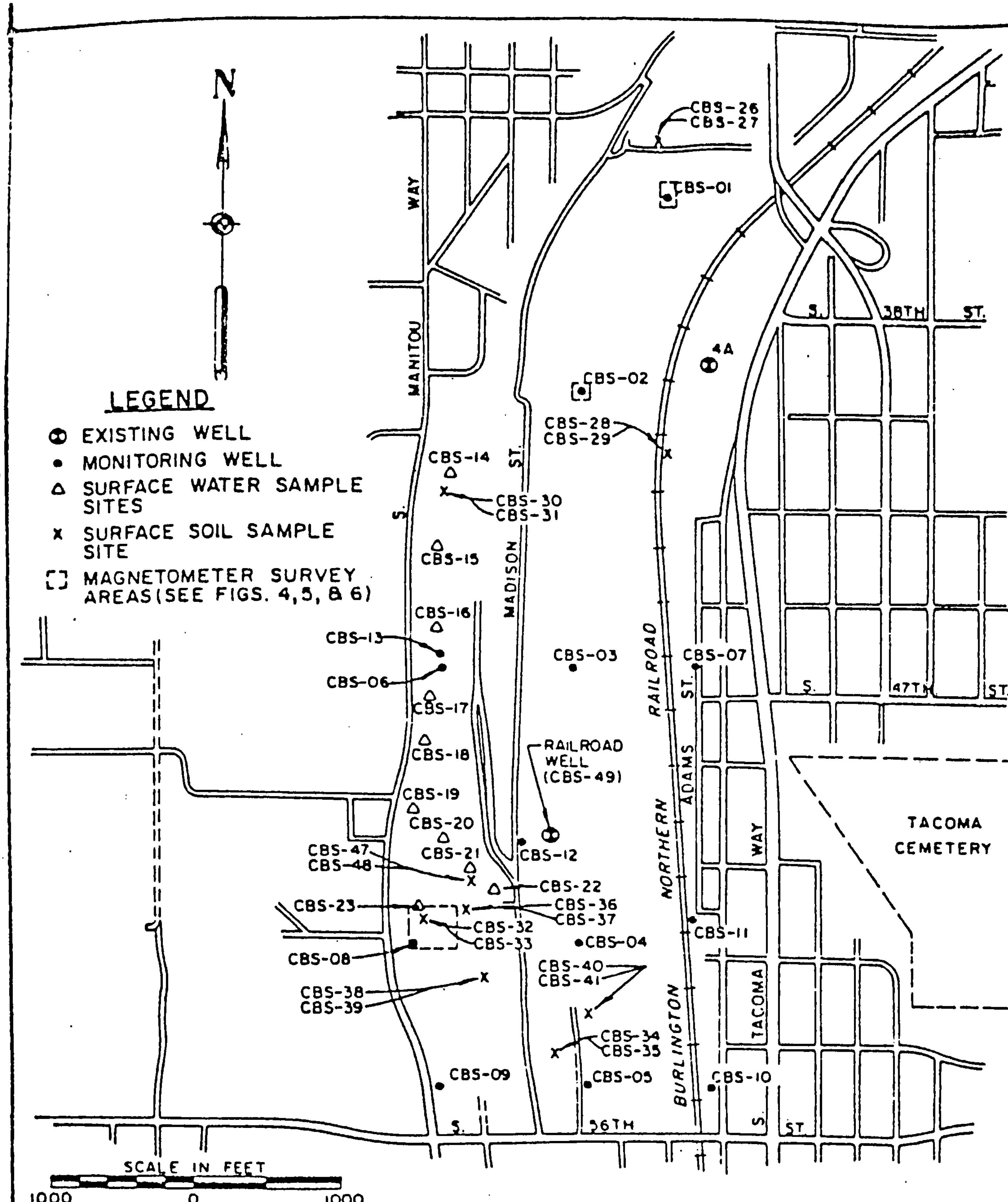
In 1981, Hart-Crowser prepared a brief writeup on the South Tacoma Channel area for the Tacoma Water Department and submitted a proposal for a detailed hydrogeologic study. These project files and other data pertinent to the area (available at Hart-Crowser) will be reviewed as the project proceeds.

The monitoring wells at the South Tacoma Swamp site (see Figure 1) were sampled during the period of June 19 through June 21, 1985. Permission to sample the wells was obtained, by Fred Gardner, from City of Tacoma and property owners. Three of the wells were not sampled because they couldn't be found or were destroyed. See T. L. Rutherford memo of June 26, 1985 for a more detailed description of the sampling effort. The samples were shipped to EPA contract laboratories for analyses. Laboratory turnaround time is unknown.

TLR:kc

Attachment: Figure 1

Distribution:
Fred Gardner, WDOE
M. G. Snyder, B&V



SAMPLE LOCATION AND VICINITY MAP

PRELIMINARY FIELD INVESTIGATION
SOUTH TACOMA SWAMP
TACOMA, WASHINGTON

FIGURE

P. O. Box 2700
203 East 4th Street, Suite 501
Olympia, WA 98507-2700

(206) 754-0515

Charles Copy.

TO Fred Gardner

AT Ecology/ Lacey, WA

SUBJECT STSW-1/ Sample no. summary

DATE 1/6/86

Enclosed is a listing of sample numbers and corresponding traffic report numbers for crossreferencing samples taken by B&V and H-C in June '85.

Please give me a call if you need any other support data.

PLEASE REPLY TO

SIGNED

Mark G. Snyder

DATE

SIGNED

REDIFORM. 4S 474

SEND PARTS 1 AND 3 INTACT - PART 3 WILL BE RETURNED WITH REPLY.

POLY PAK (50 SETS) 4P474

...k & ...TCH
...ULTING ...GINEERS
Kansas City
Dallas
Denver
Orlando

Subject

Work

Project No.

File No.

Date 19
Set Up By
Computed By
Checked By
Page No. of

	New Sample Number	Old Sample Number	Traffic Report Number	Ino.	Org.	Dup.	Spike
	TS-03A1-2-B	South Tacoma Swamp CBS-03	JA 512		✓		
	TS-01A1-2-B	" " " " -01	JA 513		✓		
	TS-02A1-2-B	" " " " -02	JA 514		✓		
Blank	TS-B1-00-B	—	JA 515		✓		
					✓		
					✓		
					✓		
	TS-04A1-2-B	" " " " -04	JA 519		✓		
	TS-12A1-2-B	" " " " -12	JA 520		✓		
	TS-10A1-2-B	" " " " -10	JA 521		✓		
	TS-09A1-2-B	" " " " -09	JA 522		✓	*	
	TS-11A1-2-B	" " " " -11	JA 523		✓	✓	
	TS-06A1-2-B	" " " " -06	JA 524		✓		
	TS-13A1-2-B	" " " " -13	JA 525		✓	✓	
	TS-05A1-2-B	" " " " -05	JA 526		✓	*	
	TS-04A1-2-M	" " " " -04	MJA 305	✓			
	TS-05A1-2-M	" " " " -05	MJA 311	✓		*	
	TS-13A1-2-M	" " " " -13	MJA 312	✓		✓	
	TS-09A1-2-M	" " " " -09	MJA 313	✓		*	
	TS-11A1-2-M	" " " " -11	MJA 314	✓		✓	
	TS-06A1-2-M	" " " " -06	MJA 315	✓			
	TS-14A1-2-M	" " " " -14	MJA 317	✓			
Blank	TS-B2-00-M	—	MJA 318	✓			
	TS-12A1-2-M	" " " " -12	MJA 324	✓			
	TS-10A1-2-M	" " " " -10	MJA 325	✓			
	TS-01A1-2-M	" " " " -01	MJA 326	✓			
	TS-02A1-2-M	" " " " -02	MJA 327	✓			
	TS-03A1-2-M	" " " " -03	MJA 328	✓			

DO NOT WRITE IN THIS SPACE

P-GN-025-4

...K &
...TCH
...SULTING
...NGINEERS
Kansas City
Dallas
Denver
Orlando

SUBJECT ______ DATE ______ 19 ___
WORK ______ SET UP BY ______
COMPUTED BY ______
CHECKED BY ______
PROJECT NO. ______ FILE NO. ______ PAGE NO. ______ OF ______

* - duplicate of sample #

	New Sample Number	Old Sample Number	Traffic Report Number	In.	Orig.	Dup.	Spike
	TS-03A1-2-V	South Tacoma Swamp CBS-03	JA 512		✓		
	TS-01A1-2-V	" " " " -01	JA 513		✓		
	TS-02A1-2-V	" " " "-02	JA 514		✓		
Blank	TS-B1-00-V	—	JA 515		✓		
					✓		
					✓		
					✓		
	TS-04A1-2-V	" " " "-04	JA 519		✓		
	TS-12A1-2-V	" " " "-12	JA 520		✓		
	TS-10A1-2-V	" " " "-10	JA 521		✓		
	TS-09A1-2-V	" " " "-09	JA 522		✓	*	
	TS-11A1-2-V	" " " "-11	JA 523		✓	✓	
	TS-06A1-2-V	" " " "-06	JA 524		✓		
	TS-13A1-2-V	" " " "-13	JA 525		✓	✓	
	TS-05A1-2-V	" " " "-05	JA 526		✓	*	
	TS-04A1-2C	" " " "-04	MJA 305	✓			
	TS-05A1-2-C	" " " "-05	MJA 311	✓		*	
	TS-13A1-2C	" " " "-13	MJA 312	✓		✓	
	TS-09A1-2C	" " " "-09	MJA 313	✓		*	
	TS-11A1-2C	" " " "-11	MJA 314	✓		✓	
	TS-06A1-2-C	" " " "-06	MJA 315	✓			
	TS-14A1-2-C	" " " "-14	MJA 317	✓			
Blank	TS-B2-00	—	MJA 318	✓			
	TS-12A1-2C	" " " "-12	MJA 324	✓			
	TS-10A1-2-C	" " " "-10	MJA 325	✓			
	TS-01A1-2-C	" " " "-01	MJA 326	✓			
	TS-02A1-2C	" " " "-02	MJA 327	✓			
	TS-03A1-2C	" " " "-03	MJA 328	✓			

DO NOT WRITE IN THIS SPACE

P.GN.025.4

APPENDIX O

ECOLOGY AND ENVIRONMENT
INTERNAL MEMORANDUM - 1985

APPENDIX O

ECOLOGY AND ENVIRONMENT
INTERNAL MEMORANDUM - 1985

ecology and environment, inc.
108 SOUTH WASHINGTON, SUITE 302, SEATTLE, WASHINGTON 98104, TEL. 206-624-9537
International Specialists in the Environmental Sciences

MEMORANDUM

DATE: August 23, 1985

TO: John Osborn, FIT RPO, USEPA, Region X

FROM: Roger McGinnis, Chemist, E&E, Seattle
Andrew Hafferty, Senior Chemist, E&E, Seattle

SUBJ: QA of Case 4565 (Inorganics)
South Tacoma Swamp WA0433

THRU: Dave Buecker, FIT RPM, E&E, Seattle

REF: TDD-R10-8507-01

CC: Gerald Muth, EPA, Manchester
Pat Storm, EPA, Seattle
Patricia Krantz, DPO, EPA, Region III

The Quality Assurance review of thirteen samples, Case 4565, collected at South Tacoma Swamp has been completed. Thirteen water samples were analyzed at low level for inorganics by JTC Environmental Consultants, Inc.,of Rockville, Maryland. The samples were numbered:

MJA305	MJA314	MJA324
MJA311	MJA315	MJA325
MJA312	MJA317	MJA326
MJA313	MJA318	MJA327
		MJA328

Data Qualifications

The following comments refer to the laboratory performance in meeting the Quality Control Specifications outlined in IFB WA84J091.

1) Timeliness - No deficiencies.

2) Initial Calibration Verfication - 1 out of 24 elements out of control.

Element	% R	QA Limit
Sodium	112%	90-110%

The laboratory listed 110 % R for sodium.

Form I A

U.S. EPA Contract Laboratory Program
Sample Management Office
P.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No. MJA305

Date 7/22/85

INORGANIC ANALYSIS DATA SHEET

LAB NAME JTC Environmental Cnslts.

CASE NO. 4565

SOW NO. 784

LAB SAMPLE ID. NO. 71-2044

QC REPORT NO. 203

Elements Identified and Measured

Concentration: Low ✓ Medium ____

Matrix: Water ✓ Soil ____ Sludge ____ Other ____

ug/L or mg/kg dry weight (Circle One)

1. Aluminum	140	13. Magnesium	7680
2. Antimony	52U	14. Manganese	11U
3. Arsenic	6.7U	15. Mercury	0.20 J
4. Barium	26	16. Nickel	18U
5. Beryllium	4.9U	17. Potassium	~~466U~~ 1320
6. Cadmium	4	18. Selenium	3.9U
7. Calcium	12040	19. Silver	9.6U J
8. Chromium	7.9U	20. Sodium	21,860 J
9. Cobalt	20U	21. Thallium	2.6U J
10. Copper	15U	22. Tin	34U J
11. Iron	41U	23. Vanadium	33U
12. Lead	2.4U J	24. Zinc	128 J
Cyanide	N.R. Auto An	Percent Solids (%)	N.R.

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments:

Lab Manager E. S.

7.22.85
5/6/85

Form I I

U.S. EPA Contract Laboratory Program
Sample Management Office
.O. Box 818 - Alexandria, VA 22313
703/557-2490 FTS: 8-557-2490

EPA Sample No.
MJA 324

Date 7/22/85

INORGANIC ANALYSIS DATA SHEET

LAB NAME JTC Environmental Cnslts.

)W NO. 784 CASE NO. 4565

LAB SAMPLE ID. NO. 71-2052 QC REPORT NO. 203

Elements Identified and Measured

ncentration: Low ✓ Medium ______

rix: Water ✓ Soil ______ Sludge ______ Other ______

ug/L or mg/kg dry weight (Circle One)

	Aluminum	160	13.	Magnesium	5240
	Antimony	70	14.	Manganese	11U
	Arsenic	6.7U	15.	Mercury	0.20 J
	Barium	11U	16.	Nickel	18U
	Beryllium	4.9U	17.	Potassium	2910
	Cadmium	3.6U	18.	Selenium	3.9U
	alcium	14200	19.	Silver	9.6U
	Chromium	7.9U	20.	Sodium	27890 J
	obalt	20U	21.	Thallium	2.6U J
	Copper	20	22.	Tin	34U J
	on	47	23.	Vanadium	33U
	ad	2.4U J	24.	Zinc	37 J
	ide	N.R. Auto An		Percent Solids (%)	N.R.

es: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

tes: ______

Lab Manager E. E.

ecology and environment, inc.
108 SOUTH WASHINGTON, SUITE 302, SEATTLE, WASHINGTON 98104, TEL. 206-624-9537
International Specialists in the Environmental Sciences

MEMORANDUM

DATE: August 30, 1985

TO: John Osborn, FIT RPO, USEPA, Region X

FROM: Robert Stuart, Chemist, E&E, Seattle RGS
for Andrew Hafferty, Senior Chemist, E&E, Seattle
KHH

SUBJ: QA of Case 4565 (Organics)
South Tacoma Swamp WA0433

THRU: Dave Buecker, FIT RPM, E&E, Seattle DB

REF: TDD-R10-8507-01

CC: Gerald Muth, EPA, Manchester
Edward Taylor, DPO, EPA, Region I
Jack Sceva, EPA, Region X

The Quality Assurance review of twelve samples, Case 4565, collected at South Tacoma Swamp has been completed. Twelve water samples were analyzed at low level by ERCO of Cambridge, Massachusetts for VOAs, BNAs, and pesticides. The samples were numbered:

JA512	JA519	JA523
JA513	JA520	JA524
JA514	JA521	JA525
JA515	JA522	JA526

Data Qualifications

The following comments refer to the laboratory performance in meeting the Quality Control Specifications outlined in IFB WA84A-266.

1) Timeliness

Four VOA samples exceeded the contract holding time between sample receipt and analysis. Sample Traffic Reports were missing.

Sample	Holding Time	QC Limit
JA512	11 days	7 days
JA515	11	7
JA520	11	7
JA523	11	7

Ten BNA samples exceed the contract holding time.

Sample	Holding Time	QC Limit
JA512	15 days	5 days
JA514	15	5
JA515	15	5
JA519	15	5
JA520	15	5
JA521	15	5
JA522	15	5
JA523	15	5
JA524	15	5
JA525	15	5
JA526	15	5

2) Instrument Tuning - Acceptable

3) Initial Calibration

Date	Compound	$\overline{RF}$	QC Limit
6/30/85	Bromoform	0.23	>0.250

4) Continuing Calibration

Date	Compound	% D	QC Limit
7/1/85	Vinyl chloride	33	<25%
7/12/85	Di-n-octylphthalate	34	<25%

5) Detection Limits - Acceptable

6) Pesticide Standards

a) Linearity - Acceptable

b) 4,4'-DDT/Endrin Breakdown - Acceptable

c) Dibutylchlorendate Retention Limit Shift - Acceptable

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 SIXTH AVENUE
SEATTLE, WA 98101

TARGET SHEET

The following document was not imaged.
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**A copy of the document may be requested from the Superfund Records Center.

Document Information

Document ID #: 1427615

File #: TSWSF 1.6.2 v.1

Site Name: Commencement Bay (TSWSF)

Test Pit Location Plan
Anderson Enterprises Property
Tacoma WA
March 1985

d) Standards Summary - Acceptable, with the exception of:

Date	Column	Compound	% D	QC Limit
7/3/85	2250/2401	Dieldrin	27.3	<20%

7) Blanks - Acceptable

8) Surrogate Recovery

VOAs - Acceptable
BNAs - Seven out of 96 were outside QC limits.

Sample	Compound	% Recovery	QC Limit
JA513	Nitrobenzene	123	41-120%
JA525 (MS)	2-Fluoro-biphenyl	133	41-119
JA525 (MS)	Terphenyl-d14	570	33-128
JA525 (MSD)	2-Fluoro-biphenyl	133	44-119
JA525 (MSD)	Terphenyl-d14	569	33-128
ERCO-I	Nitrobenzene-d5	128	41-120
ERCO-I	Terphenyl-d14	170	33-128

9) Matrix Spike and Matrix Spike Duplicates

a) Volatile Fraction

The following compounds exceeded RPD QC limits:

Compound	Fraction	RPD	QC Limit
Chlorobenzene	VOA	14	<13
Toluene	VOA	15	<13

b) BNA Fraction

The following compounds exceeded QC limits for % Recovery:

Compound	Fraction	% Recovery	QC Limit
2,4-Dinitrotoluene (MSD)	BNA	20	24- 96%
N-nitro-di-n-propylamine (MSD)	BNA	39	41-116%
4-Nitrophenol (MSD)	Acid	0	10- 80%
Lindane (MSD)	Pest.	50	56-123%
Endrin (MSD)	Pest.	132	56-121%
Endrin (MS)	Pest.	128	56-121%

10) Samples - Acceptable

11) Laboratory Contact

The laboratory was contacted on August 13, 1985. See attached telephone contact log.

Data Use

The usefulness of the data is based on the criteria outlined in the "Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses (R-582-5-5-01)." The data is ACCEPTABLE for use except where flagged with data qualifiers which modify the usefulness of the individual values.

Data Qualifiers

U - The material was analyzed for, but was not detected. The associated numerical value is the estimated sample quantitation limit.

J - The associated numerical value is an estimated quantity because quality control criteria were not met.

R - Quality Control indicates that data are unusable (compound may or may not be present). Resampling and reanalysis is necessary for verification.

Q - No analytical result.

N - Presumptive evidence of presence of material (tentative identification).

In Reference to Case No(s):
4565

Contract Laboratory Program
REGIONAL/LABORATORY COMMUNICATION SYSTEM

Telephone Record Log

Date of Call: 13 August 85

Laboratory Name: ERCO

Lab Contact: Heidi Stolle

Region: 10

Regional Contact: Andrew Hafferty

Call Initiated By: ____ Laboratory X Region

In reference to data for the following sample number(s):

JA 525	JA 514	JA 522
JA 525 MS	JA 519	JA 521
JA 525 MSD	JA 526	JA 523
JA 513	JA 524	JA 520

Summary of Questions/Issues Discussed:

VOA - BFB tuning for these samples run 0031 to 1804 on 7/1/85 - Tuning & Continuing Calibration listed as run AFTER samples - not before as they should.

Summary of Resolution:

JA 523 and JA520 run on 5 June 85

All other samples run on 7/2/85 - clock change on instrument at 2400 hrs does not change date - samples actually run 7/2/85

Data Acceptable.

Signature

13 August 85
Date

Distribution: (1)Lab Copy, (2)Region Copy, (3)SMO Copy

Environmental Protection Agency · CLP ...
P O Box 818 · Alexandria Virginia 22313 703/557-2490

JA512

REL 8/18/85

Organics Analysis Data Sheet
(Page 1)

Laboratory Name ERCO/A Division of ENSECO
Lab Sample ID No 17207
Sample Matrix Water
Data Release Authorized By JFM

Case No 4565
QC Report No 140
Contract No 68-01-7027
Date Sample Received 6/24/85

Volatile Compounds

Concentration: Low Medium (Circle One)
Date Extracted/Prepared 7-5-85
Date Analyzed 7-5-85
Conc/Dil Factor 1 pH —
Percent Moisture —
Percent Moisture (Decanted) —

* VOA Chromatogram and Quant Report for 6/29/85 included for time criteria only

	CAS Number		ug/l or ug/Kg (Circle One)
6U	74-87-3	Chloromethane	10 u J
KU	74-83-9	Bromomethane	10 u
[illegible]	75-01-4	Vinyl Chloride	10 u
[illegible]	75-00-3	Chloroethane	10 u
14U	75-09-2	Methylene Chloride	10 u
	67-64-1	Acetone	25 u
	75-15-0	Carbon Disulfide	10 u
19U	75-35-4	1,1-Dichloroethene	10 u
13U	75-34-3	1,1-Dichloroethane	10 u
10U	156-60-5	Trans-1,2-Dichloroethene	10 u
13U	67-66-3	Chloroform	10 u
10U	107-06-2	1,2-Dichloroethane	10 u
	78-93-3	2-Butanone	10 u
11U	71-55-6	1,1,1-Trichloroethane	10 u
6U	56-23-5	Carbon Tetrachloride	10 u
	108-05-4	Vinyl Acetate	10 u
44U	75-27-4	Bromodichloromethane	10 u

	CAS Number		ug/l or ug/Kg (Circle One)
15U	79-34-5	1,1,2,2-Tetrachloroethane	10 u J
37U	78-87-5	1,2-Dichloropropane	10 u
13C	10061-02-6	Trans-1,3-Dichloropropene	10 u
87U	79-01-6	Trichloroethene	10 u
61U	124-48-1	Dibromochloromethane	10 u
14U	79-00-5	1,1,2-Trichloroethane	10 u
4U	71-43-2	Benzene	10 u
	10061-01-5	cis-1,3-Dichloropropene	10 u
19U	110-75-8	2-Chloroethylvinylether	10 u
47U	75-25-2	Bromoform	10 u
	591-78-6	2-Hexanone	10 u
	108-10-1	4-Methyl-2-Pentanone	10 u
25U	127-18-4	Tetrachloroethene	10 u
86U	108-88-3	Toluene	10 u
7U	108-90-7	Chlorobenzene	10 u
39U	100-41-4	Ethylbenzene	10 u
	100-42-5	Styrene	10 u
		Total Xylenes	10 u

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

Value: If the result is a value greater than or equal to the detection limit, report the value.

U Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g. 10U) based on necessary concentration/dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read: U-Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.

J Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicated the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g. 10J).

C This flag applies to pesticide parameters where the identification has been confirmed by GC/MS. Single component pesticides ≥10 ng/ul in the final extract should be confirmed by GC/MS.

B This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

Other: Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

K Indicates compound was detected and identified, but the concentration is below reporting detection limit.

Form I

4/84

8/12/86

Environmental Protection Agency CLP Sample Management Office
P.O. Box 818, Alexandria, Virginia 22313 703/557-2490

Sample Number
JA512

Organics Analysis Data Sheet
(Page 2)

Semivolatile Compounds

Concentration: Low Medium (Circle One)

Date Extracted/Prepared: 7-9-85

Date Analyzed: 7-11-85

Conc/Dil Factor: 2

	CAS Number		ug/l or ug/Kg (Circle One)
61B	62-75-9	N-Nitrosodimethylamine	20 u J
65A	108-95-2	Phenol	20 u
	62-53-3	Aniline	20 u
18B	111-44-4	bis(-2-Chloroethyl)Ether	20 u
24A	95-57-8	2-Chlorophenol	20 u
26B	541-73-1	1,3-Dichlorobenzene	20 u
27B	106-46-7	1,4-Dichlorobenzene	20 u
	100-51-6	Benzyl Alcohol	20 u
25B	95-50-1	1,2-Dichlorobenzene	20 u
	95-48-7	2-Methylphenol	20 u
42B	39638-32-9	bis(2-chloroisopropyl)Ether	20 u
	106-44-5	4-Methylphenol	20 u
63B	621-64-7	N-Nitroso-Di-n-Propylamine	20 u
12B	67-72-1	Hexachloroethane	20 u
56B	98-95-3	Nitrobenzene	20 u
54B	78-59-1	Isophorone	20 u
57A	88-75-5	2-Nitrophenol	20 u
34A	105-67-9	2,4-Dimethylphenol	20 u
	65-85-0	Benzoic Acid	20 u
43B	111-91-1	bis(-2-Chloroethoxy)Methane	20 u
31A	120-83-2	2,4-Dichlorophenol	20 u
8B	120-82-1	1,2,4-Trichlorobenzene	20 u
55B	91-20-3	Naphthalene	20 u
	106-47-8	4-Chloroaniline	20 u
52B	87-68-3	Hexachlorobutadiene	20 u
22A	59-50-7	4-Chloro-3-Methylphenol	20 u
	91-57-6	2-Methylnaphthalene	20 u
53B	77-47-4	Hexachlorocyclopentadiene	20 u
21A	88-06-2	2,4,6-Trichlorophenol	20 u
	95-95-4	2,4,5-Trichlorophenol	20 u
20B	91-58-7	2-Chloronaphthalene	20 u
	88-74-4	2-Nitroaniline	20 u
71B	131-11-3	Dimethyl Phthalate	20 u
77B	208-96-8	Acenaphthylene	20 u
	99-09-2	3-Nitroaniline	20 u

	CAS Number		ug/l or ug/Kg (Circle One)
1B	83-32-9	Acenaphthene	20 u J
59A	51-28-5	2,4-Dinitrophenol	20 u
58A	100-02-7	4-Nitrophenol	20 u
	132-64-9	Dibenzofuran	20 u
35B	121-14-2	2,4-Dinitrotoluene	20 u
36B	606-20-2	2,6-Dinitrotoluene	20 u
70B	84-66-2	Diethylphthalate	20 u
40B	7005-72-3	4-Chlorophenyl-phenylether	20 u
80B	86-73-7	Fluorene	20 u
	100-01-6	4-Nitroaniline	20 u
60A	534-52-1	4,6-Dinitro-2-Methylphenol	20 u
62B	86-30-6	N-Nitrosodiphenylamine (1)	20 u
41B	101-55-3	4-Bromophenyl-phenylether	20 u
9B	118-74-1	Hexachlorobenzene	20 u
64A	87-86-5	Pentachlorophenol	20 u
81B	85-01-8	Phenanthrene	20 u
78B	120-12-7	Anthracene	20 u
68B	84-74-2	Di-n-Butylphthalate	20 u
39B	206-44-0	Fluoranthene	20 u
5B	92-87-5	Benzidine	20 u
84B	129-00-0	Pyrene	20 u
67B	85-68-7	Butylbenzylphthalate	20 u
28B	91-94-1	3,3'-Dichlorobenzidine	20 u
72B	56-55-3	Benzo(a)Anthracene	20 u
66B	117-81-7	bis(2-Ethylhexyl)Phthalate	1 J
76B	218-01-9	Chrysene	20 u
69B	117-84-0	Di-n-Octyl Phthalate	20 u
74B	205-99-2	Benzo(b)Fluoranthene	20 u
75B	207-08-9	Benzo(k)Fluoranthene	20 u
73B	50-32-8	Benzo(a)Pyrene	20 u
83B	193-39-5	Indeno(1,2,3-cd)Pyrene	20 u
82B	53-70-3	Dibenz(a,h)Anthracene	20 u
79B	191-24-2	Benzo(g,h,i)Perylene	20 u

(1)-Cannot be separated from diphenylamine

4/84

Environmental Protection Agency CLP Sample Management Office
P O Box 818 Alexandria Virginia 22313 703/557-2490

Sample Number
JA 512-

RfA
8/12/85

Organics Analysis Data Sheet
(Page 3)

Pesticide/PCBs

Concentration **Low** Medium (Circle One)

Date Extracted/Prepared 6-25-85

Date Analyzed 7-3-85

Conc/Dil Factor diL=1

	CAS Number		ug/L or ug/Kg (Circle One)
102P	319-84-6	Alpha-BHC	0.1 U → ok
103P	319-85-7	Beta-BHC	0.1 U
104P	319-86-8	Delta-BHC	0.1 U
105P	58-89-9	Gamma-BHC (Lindane)	0.1 U
100P	76-44-8	Heptachlor	0.1 U
89P	309-00-2	Aldrin	0.1 U
101P	1024-57-3	Heptachlor Epoxide	0.1 U
	959-98-8	Endosulfan I	0.1 U
90P	60-57-1	Dieldrin	0.1 U
93P	72-55-9	4,4'-DDE	0.1 U
98P	72-20-8	Endrin	0.1 U
	33213-65-9	Endosulfan II	0.1 U
94P	72-54-8	4,4'-DDD	0.1 U
99P	7421-93-4	Endrin Aldehyde	0.1 U
97P	1031-07-8	Endosulfan Sulfate	0.1 U
92P	50-29-3	4,4'-DDT	0.1 U
	72-43-5	Methoxychlor	0.2 U
	53494-70-5	Endrin Ketone	0.1 U
91P	57-74-9	Chlordane	0.2 U
113P	8001-35-2	Toxaphene	0.2 U
112P	12674-11-2	Aroclor-1016	0.2 U
109P	11104-28-2	Aroclor-1221	0.2 U
108P	11141-16-5	Aroclor-1232	0.2 U
106P	53469-21-9	Aroclor-1242	0.2 U
110P	12672-29-6	Aroclor-1248	0.2 U
107P	11097-69-1	Aroclor-1254	0.2 U
111P	11096-82-5	Aroclor-1260	0.2 U

V_i = Volume of extract injected (ul)

V_s = Volume of water extracted (ml)

W_s = Weight of sample extracted (g)

V_t = Volume of total extract (ul)

V_s 500 or W_s NA V_t 500 V_i 2.7

P.O. Box 818 · Alexandria, Virginia 22313 703/557-2490

JA513

Organics Analysis Data Sheet
(Page 1)

Laboratory Name: ERCO/A Division of ENSECO
Case No: 4565
Lab Sample ID No: 17205
QC Report No: 140
Sample Matrix: water
Contract No: 68-01-7037
Data Release Authorized By: JFM
Date Sample Received: 6/24/85

RLB 8/12/85

Volatile Compounds

Concentration: Low Medium (Circle One)

Date Extracted/Prepared: 7-1-85

Date Analyzed: 7-1-85

Conc/Dil Factor: 1 pH: –

Percent Moisture: –

Percent Moisture (Decanted): –

	CAS Number		ug/l or ug/Kg (Circle One)
5U	74-87-3	Chloromethane	10 u
4U	74-83-9	Bromomethane	10 u
19U	75-01-4	Vinyl Chloride	10 u
6U	75-00-3	Chloroethane	10 u
4U	75-09-2	Methylene Chloride	10 u
	67-64-1	Acetone	25 u
	75-15-0	Carbon Disulfide	10 u J
9U	75-35-4	1,1-Dichloroethene	10 u
13U	75-34-3	1,1-Dichloroethane	10 u
0U	156-60-5	Trans-1,2-Dichloroethene	10 u
3U	67-66-3	Chloroform	10 u
10U	107-06-2	1,2-Dichloroethane	10 u
	78-93-3	2-Butanone	10 u J
1U	71-55-6	1,1,1-Trichloroethane	10 u J
6U	56-23-5	Carbon Tetrachloride	10 u
	108-05-4	Vinyl Acetate	10 u J
47U	75-27-4	Bromodichloromethane	10 u J

	CAS Number		ug/l or ug/Kg (Circle One)
15U	79-34-5	1,1,2,2-Tetrachloroethane	10 u J
37U	78-87-5	1,2-Dichloropropane	10 u
33U	10061-02-6	Trans-1,3-Dichloropropene	10 u
37U	79-01-6	Trichloroethene	10 u
51U	124-48-1	Dibromochloromethane	10 u J
14U	79-00-5	1,1,2-Trichloroethane	10 u
4U	71-43-2	Benzene	10 u
	10061-01-5	cis-1,3-Dichloropropene	10 u J
19U	110-75-8	2-Chloroethylvinylether	10 u
47U	75-25-2	Bromoform	10 u J
	591-78-6	2-Hexanone	10 u J
	108-10-1	4-Methyl-2-Pentanone	10 u J
25U	127-18-4	Tetrachloroethene	10 u
36U	108-88-3	Toluene	10 u
7U	108-90-7	Chlorobenzene	10 u
37U	100-41-4	Ethylbenzene	10 u
	100-42-5	Styrene	10 u
		Total Xylenes	10 u

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

Value If the result is a value greater than or equal to the detection limit, report the value.

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J Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g. 10J).

C This flag applies to pesticide parameters where the identification has been confirmed by GC/MS. Single component pesticides ≥10 ng/ul in the final extract should be confirmed by GC/MS.

B This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

Other Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

K Indicates compound was detected and identified, but the concentration is below reporting detection limit.

Form I

4/84

Environmental Protection Agency CLP Sample Management Office
P. O. Box 818 Alexandria, Virginia 22313 703/557-2490

Sample Number
JA513

Organics Analysis Data Sheet
(Page 2)

RLS
8/12/85

Semivolatile Compounds

Concentration: Low Medium (Circle One)

Date Extracted/Prepared: 6-25-85

Date Analyzed: 7-3-85

Conc/Dil Factor: 2

	CAS Number		ug/l or ug/Kg (Circle One)
61B	62-75-9	N-Nitrosodimethylamine	20 U
65A	108-95-2	Phenol	20 U
	62-53-3	Aniline	20 U
18B	111-44-4	bis(-2-Chloroethyl)Ether	20 U
24A	95-57-8	2-Chlorophenol	20 U
26B	541-73-1	1, 3-Dichlorobenzene	20 U
27B	106-46-7	1, 4-Dichlorobenzene	20 U
	100-51-6	Benzyl Alcohol	20 U
25B	95-50-1	1, 2-Dichlorobenzene	20 U
	95-48-7	2-Methylphenol	20 U
42B	39638-32-9	bis(2-chloroisopropyl)Ether	20 U
	106-44-5	4-Methylphenol	20 U
63B	621-64-7	N-Nitroso-Di-n-Propylamine	20 U
12B	67-72-1	Hexachloroethane	20 U
56B	98-95-3	Nitrobenzene	20 U
54B	78-59-1	Isophorone	20 U
57A	88-75-5	2-Nitrophenol	20 U
34A	105-67-9	2, 4-Dimethylphenol	20 U
	65-85-0	Benzoic Acid	20 U
43B	111-91-1	bis(-2-Chloroethoxy)Methane	20 U
31A	120-83-2	2, 4-Dichlorophenol	20 U
8B	120-82-1	1, 2, 4-Trichlorobenzene	20 U
55B	91-20-3	Naphthalene	20 U
	106-47-8	4-Chloroaniline	20 U
52B	87-68-3	Hexachlorobutadiene	20 U
22A	59-50-7	4-Chloro-3-Methylphenol	20 U
	91-57-6	2-Methylnaphthalene	20 U
53B	77-47-4	Hexachlorocyclopentadiene	20 U
21A	88-06-2	2, 4, 6-Trichlorophenol	20 U
	95-95-4	2, 4, 5-Trichlorophenol	20 U
20A	91-58-7	2-Chloronaphthalene	20 U
	88-74-4	2-Nitroaniline	20 U
71B	131-11-3	Dimethyl Phthalate	20 U
77B	208-96-8	Acenaphthylene	20 U
	99-09-2	3-Nitroaniline	20 U J

	CAS Number		ug/l or ug/Kg (Circle One)
1B	83-32-9	Acenaphthene	20 U
59A	51-28-5	2, 4-Dinitrophenol	20 U
58A	100-02-7	4-Nitrophenol	20 U
	132-64-9	Dibenzofuran	20 U
35B	121-14-2	2, 4-Dinitrotoluene	20 U
36B	606-20-2	2, 6-Dinitrotoluene	20 U
70B	84-66-2	Diethylphthalate	20 U
40B	7005-72-3	4-Chlorophenyl-phenylether	20 U
80B	86-73-7	Fluorene	20 U
	100-01-6	4-Nitroaniline	20 U J
60A	534-52-1	4, 6-Dinitro-2-Methylphenol	20 U
62B	86-30-6	N-Nitrosodiphenylamine (1)	20 U
41B	101-55-3	4-Bromophenyl-phenylether	20 U
9B	118-74-1	Hexachlorobenzene	20 U
64A	87-86-5	Pentachlorophenol	20 U
81B	85-01-8	Phenanthrene	20 U
78B	120-12-7	Anthracene	20 U
68B	84-74-2	Di-n-Butylphthalate	20 U
39B	206-44-0	Fluoranthene	20 U
5B	92-87-5	Benzidine	20 U J
84B	129-00-0	Pyrene	20 U
67B	85-68-7	Butylbenzylphthalate	20 U
28B	91-94-1	3, 3'-Dichlorobenzidine	20 U
72B	56-55-3	Benzo(a)Anthracene	20 U
66B	117-81-7	bis(2-Ethylhexyl)Phthalate	20 U
76B	218-01-9	Chrysene	20 U
69B	117-84-0	Di-n-Octyl Phthalate	20 U J
74B	205-99-2	Benzo(b)Fluoranthene	20 U J
75B	207-08-9	Benzo(k)Fluoranthene	20 U
73B	50-32-8	Benzo(a)Pyrene	20 U
83B	193-39-5	Indeno(1, 2, 3-cd)Pyrene	20 U
82B	53-70-3	Dibenz(a, h)Anthracene	20 U
79B	191-24-2	Benzo(g, h, i)Perylene	20 U

(1)-Cannot be separated from diphenylamine

4/84

Environmental Protection Agency CLP Sample Management Office
P O Box 818 Alexandria Virginia 22313 703/557-2490

Sample Number
JA 513

RPA 8/12/85

Organics Analysis Data Sheet
(Page 3)

Pesticide/PCBs

Concentration Low Medium (Circle One)

Date Extracted/Prepared 6-25-85

Date Analyzed 7-3-85

Conc/Dil Factor. dil=1

	CAS Number		ug/l or ug/Kg (Circle One)
102P	319-84-6	Alpha-BHC	0.1 U
103P	319-85-7	Beta-BHC	0.1 U
104P	319-86-8	Delta-BHC	0.1 U
105P	58-89-9	Gamma-BHC (Lindane)	0.1 U
100P	76-44-8	Heptachlor	0.1 U
89P	309-00-2	Aldrin	0.1 U
101P	1024-57-3	Heptachlor Epoxide	0.1 U
	959-98-8	Endosulfan I	0.1 U
90P	60-57-1	Dieldrin	0.1 U
93P	72-55-9	4 4-DDE	0.1 U
98P	72-20-8	Endrin	0.1 U
	33213-65-9	Endosulfan II	0.1 U
94P	72-54-8	4 4-DDD	0.1 U
99P	7421-93-4	Endrin Aldehyde	0.1 U
97P	1031-07-8	Endosulfan Sulfate	0.1 U
92P	50-29-3	4 4-DDT	0.1 U
	72-43-5	Methoxychlor	0.2 U
	53494-70-5	Endrin Ketone	0.1 U
91P	57-74-9	Chlordane	0.2 U
113P	8001-35-2	Toxaphene	0.2 U
112P	12674-11-2	Aroclor-1016	0.2 U
108P	11104-28-2	Aroclor-1221	0.2 U
109P	11141-16-5	Aroclor-1232	0.2 U
106P	53469-21-9	Aroclor-1242	0.2 U
110P	12672-29-6	Aroclor-1248	0.2 U
107P	11097-69-1	Aroclor-1254	0.2 U
111P	11096-82-5	Aroclor-1260	0.2 U

V_i = Volume of extract injected (ul)

V_s = Volume of water extracted (ml)

W_s = Weight of sample extracted (g)

V_t = Volume of total extract (ul)

V_s 500 or W_s NA V_t 500 V_i 2.7

4/84

Environmental Protection Agency ...
P.O. Box 818, Alexandria, Virginia 22313 703/557-2490

JA514

Organics Analysis Data Sheet
(Page 1)

Laboratory Name: ERCO/A Division of ENSECO
Case No: 4565
Lab Sample ID No: 17206
QC Report No: 140
Sample Matrix: water
Contract No: 68-01-7027
Data Release Authorized By: JFM
Date Sample Received: 6/24/85

RE 8/12/85

Volatile Compounds

Concentration: Low / Medium (Circle One)
Date Extracted/Prepared: 7-1-85
Date Analyzed: 7-1-85
Conc/Dil Factor: 1 pH: –
Percent Moisture: –
Percent Moisture (Decanted): –

CAS Number		ug/l or ug/Kg (Circle One)
74-87-3	Chloromethane	10 u
74-83-9	Bromomethane	10 u
75-01-4	Vinyl Chloride	10 u
75-00-3	Chloroethane	10 u
75-09-2	Methylene Chloride	10 u
67-64-1	Acetone	10 u
75-15-0	Carbon Disulfide	10 u
75-35-4	1, 1-Dichloroethene	10 u
75-34-3	1, 1-Dichloroethane	10 u
156-60-5	Trans-1, 2-Dichloroethene	10 u
67-66-3	Chloroform	10 u
107-06-2	1, 2-Dichloroethane	10 u
78-93-3	2-Butanone	10 u
71-55-6	1, 1, 1-Trichloroethane	3 K
56-23-5	Carbon Tetrachloride	10 u
108-05-4	Vinyl Acetate	10 u
75-27-4	Bromodichloromethane	10 u

CAS Number		ug/l or ug/Kg (Circle One)
79-34-5	1, 1, 2, 2-Tetrachloroethane	10 u
78-87-5	1, 2-Dichloropropane	10 u
10061-02-6	Trans-1, 3-Dichloropropene	10 u
79-01-6	Trichloroethene	10 u
124-48-1	Dibromochloromethane	10 u
79-00-5	1, 1, 2-Trichloroethane	10 u
71-43-2	Benzene	10 u
10061-01-5	cis-1, 3-Dichloropropene	10 u
110-75-8	2-Chloroethylvinylether	10 u
75-25-2	Bromoform	10 u
591-78-6	2-Hexanone	10 u
108-10-1	4-Methyl-2-Pentanone	10 u
127-18-4	Tetrachloroethene	10 u
108-88-3	Toluene	10 u
108-90-7	Chlorobenzene	10 u
100-41-4	Ethylbenzene	10 u
100-42-5	Styrene	10 u
	Total Xylenes	10 u

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

Value — If the result is a value greater than or equal to the detection limit, report the value.

U — Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g. 10U) based on necessary concentration/dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read: U-Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.

J — Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g. 10J).

C — This flag applies to pesticide parameters where the identification has been confirmed by GC/MS. Single component pesticides ≥ 10 ng/ul in the final extract should be confirmed by GC/MS.

B — This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

Other — Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

K — Indicates compound was detected and identified, but the concentration is below reporting detection limit.

Environmental Protection Agency   CLP Sample Management Office
P.O. Box 818   Alexandria, Virginia 22313   703/557-2490

Sample Number
JA514

Organics Analysis Data Sheet
(Page 2)

REL 8/12/85

Semivolatile Compounds

Concentration: Low   Medium   (Circle One)

Date Extracted/Prepared: 7-9-85

Date Analyzed: 7-12-85

Conc/Dil Factor: 2

	CAS Number		ug/l or ug/Kg (Circle One)
41B	62-75-9	N-Nitrosodimethylamine	20 u U
65A	108-95-2	Phenol	20 u
	62-53-3	Aniline	20 u
18B	111-44-4	bis(2-Chloroethyl)Ether	20 u
24A	95-57-8	2-Chlorophenol	20 u
26B	541-73-1	1,3-Dichlorobenzene	20 u
27B	106-46-7	1,4-Dichlorobenzene	20 u
	100-51-6	Benzyl Alcohol	20 u
25B	95-50-1	1,2-Dichlorobenzene	20 u
	95-48-7	2-Methylphenol	20 u
42B	39638-32-9	bis(2-chloroisopropyl)Ether	20 u
	106-44-5	4-Methylphenol	20 u
63B	621-64-7	N-Nitroso-Di-n-Propylamine	20 u
12B	67-72-1	Hexachloroethane	20 u
56B	98-95-3	Nitrobenzene	20 u
54B	78-59-1	Isophorone	20 u
57A	88-75-5	2-Nitrophenol	20 u
34A	105-67-9	2,4-Dimethylphenol	20 u
	65-85-0	Benzoic Acid	20 u
43B	111-91-1	bis(2-Chloroethoxy)Methane	20 u
31A	120-83-2	2,4-Dichlorophenol	20 u
8B	120-82-1	1,2,4-Trichlorobenzene	20 u
55B	91-20-3	Naphthalene	20 u
	106-47-8	4-Chloroaniline	20 u
52B	87-68-3	Hexachlorobutadiene	20 u
22A	59-50-7	4-Chloro-3-Methylphenol	20 u
	91-57-6	2-Methylnaphthalene	20 u
53B	77-47-4	Hexachlorocyclopentadiene	20 u
21A	88-06-2	2,4,6-Trichlorophenol	20 u
	95-95-4	2,4,5-Trichlorophenol	20 u
20B	91-58-7	2-Chloronaphthalene	20 u
	88-74-4	2-Nitroaniline	20 u
71B	131-11-3	Dimethyl Phthalate	20 u
77B	208-96-8	Acenaphthylene	20 u
	99-09-2	3-Nitroaniline	20 u

	CAS Number		ug/l or ug/Kg (Circle One)
1B	83-32-9	Acenaphthene	20 u U
59A	51-28-5	2,4-Dinitrophenol	20 u
58A	100-02-7	4-Nitrophenol	20 u
	132-64-9	Dibenzofuran	20 u
35B	121-14-2	2,4-Dinitrotoluene	20 u
36B	606-20-2	2,6-Dinitrotoluene	20 u
70B	84-66-2	Diethylphthalate	20 u
40B	7005-72-3	4-Chlorophenyl-phenylether	20 u
80B	86-73-7	Fluorene	20 u
	100-01-6	4-Nitroaniline	20 u
60A	534-52-1	4,6-Dinitro-2-Methylphenol	20 u
62B	86-30-6	N-Nitrosodiphenylamine (1)	20 u
41B	101-55-3	4-Bromophenyl-phenylether	20 u
9B	118-74-1	Hexachlorobenzene	20 u
64A	87-86-5	Pentachlorophenol	20 u
81B	85-01-8	Phenanthrene	20 u
78B	120-12-7	Anthracene	20 u
68B	84-74-2	Di-n-Butylphthalate	20 u
39B	206-44-0	Fluoranthene	20 u
5B	92-87-5	Benzidine	20 u
84B	129-00-0	Pyrene	20 u
67B	85-68-7	Butylbenzylphthalate	20 u
28B	91-94-1	3,3'-Dichlorobenzidine	20 u
72B	56-55-3	Benzo(a)Anthracene	20 u
66B	117-81-7	bis(2-Ethylhexyl)Phthalate	20 u
76B	218-01-9	Chrysene	20 u
69B	117-84-0	Di-n-Octyl Phthalate	20 u
74B	205-99-2	Benzo(b)Fluoranthene	20 u
75B	207-08-9	Benzo(k)Fluoranthene	20 u
73B	50-32-8	Benzo(a)Pyrene	20 u
83B	193-39-5	Indeno(1,2,3-cd)Pyrene	20 u
82B	53-70-3	Dibenz(a,h)Anthracene	20 u
79B	191-24-2	Benzo(g,h,i)Perylene	20 u

(1)-Cannot be separated from diphenylamine

Environmental Protection Agency   CLP Sample Management Office
P O Box 818   Alexandria Virginia 22313   703/557-2490

Sample Number
JA 514

Organics Analysis Data Sheet
(Page 3)

RCL
8/12/85

Pesticide/PCBs

Concentration: Low   Medium   (Circle One)

Date Extracted/Prepared: 6-25-85

Date Analyzed: 7-3-85

Conc/Dil Factor: diL=1

	CAS Number		ug/l or ug/Kg (Circle One)
102P	319-84-6	Alpha-BHC	0.1 U
103P	319-85-7	Beta-BHC	0.1 U
104P	319-86-8	Delta-BHC	0.1 U
105P	58-89-9	Gamma-BHC (Lindane)	0.1 U
100P	76-44-8	Heptachlor	0.1 U
89P	309-00-2	Aldrin	0.1 U
101P	1024-57-3	Heptachlor Epoxide	0.1 U
	959-98-8	Endosulfan I	0.1 U
90P	60-57-1	Dieldrin	0.1 U
93P	72-55-9	4,4'-DDE	0.1 U
98P	72-20-8	Endrin	0.1 U
	33213-65-9	Endosulfan II	0.1 U
94P	72-54-8	4,4'-DDD	0.1 U
99P	7421-93-4	Endrin Aldehyde	0.1 U
97P	1031-07-8	Endosulfan Sulfate	0.1 U
92P	50-29-3	4,4'-DDT	0.1 U
	72-43-5	Methoxychlor	0.2 U
	53494-70-5	Endrin Ketone	0.1 U
91P	57-74-9	Chlordane	0.2 U
113P	8001-35-2	Toxaphene	0.2 U
112P	12674-11-2	Aroclor-1016	0.2 U
108P	11104-28-2	Aroclor-1221	0.2 U
109P	11141-16-5	Aroclor-1232	0.2 U
106P	53469-21-9	Aroclor-1242	0.2 U
110P	12672-29-6	Aroclor-1248	0.2 U
107P	11097-69-1	Aroclor-1254	0.2 U
111P	11096-82-5	Aroclor-1260	0.2 U

V_i = Volume of extract injected (ul)

V_s = Volume of water extracted (ml)

W_s = Weight of sample extracted (g)

V_t = Volume of total extract (ul)

V_s 500   or W_s NA V_t 500 V_i 2.7

Form 1   4/84

Environmental Protection Agency CLP Sample Management Office
P.O. Box 818 Alexandria Virginia 22313 703/557-2490

Sample Number
JA515

Organics Analysis Data Sheet
(Page 1)

Rec'd 8/12/85

Laboratory Name	ERCO/A Division of ENSECO	Case No	4565
Lab Sample ID No	17216	QC Report No	140
Sample Matrix	water	Contract No	68-01-7027
Data Release Authorized By	JFM	Date Sample Received	6/24/85

Volatile Compounds

Concentration: Low Medium (Circle One)

Date Extracted/Prepared 7/5/85

Date Analyzed 7/5/85

Conc/Dil Factor: 1.0 pH —

Percent Moisture: —

Percent Moisture (Decanted) —

☆ VOA chromatogram and Quant report included for time criteria only for 7/1/85

	CAS Number		ug/l or ug/Kg (Circle One)
45U	74-87-3	Chloromethane	10 u J
46U	74-83-9	Bromomethane	10 u
45U	75-01-4	Vinyl Chloride	10 u
16U	75-00-3	Chloroethane	10 u
44U	75-09-2	Methylene Chloride	10
	67-64-1	Acetone	10 u
	75-15-0	Carbon Disulfide	10 u
49U	75-35-4	1,1-Dichloroethene	10 u
13U	75-34-3	1,1-Dichloroethane	10 u
20U	156-60-5	Trans-1,2-Dichloroethene	10 u
23U	67-66-3	Chloroform	10 u
10U	107-06-2	1,2-Dichloroethane	10 u
	78-93-3	2-Butanone	10 u
11U	71-55-6	1,1,1-Trichloroethane	10 u
6U	56-23-5	Carbon Tetrachloride	10 u
	108-05-4	Vinyl Acetate	10 u
45U	75-27-4	Bromodichloromethane	10 u

	CAS Number		ug/l or ug/Kg (Circle One)
15U	79-34-5	1,1,2,2-Tetrachloroethane	10 u J
37U	78-87-5	1,2-Dichloropropane	10 u
33U	10061-02-6	Trans-1,3-Dichloropropene	10 u
37U	79-01-6	Trichloroethene	10 u
51U	124-48-1	Dibromochloromethane	10 u
14U	79-00-5	1,1,2-Trichloroethane	10 u
4U	71-43-2	Benzene	10 u
	10061-01-5	cis-1,3-Dichloropropene	10 u
19U	110-75-8	2-Chloroethylvinylether	10 u
47U	75-25-2	Bromoform	10 u
	591-78-6	2-Hexanone	10 u
	108-10-1	4-Methyl-2-Pentanone	10 u
25U	127-18-4	Tetrachloroethene	10 u
36U	108-88-3	Toluene	10 u
7U	108-90-7	Chlorobenzene	10 u
35U	100-41-4	Ethylbenzene	10 u
	100-42-5	Styrene	10 u
		Total Xylenes	10 u

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

Value If the result is a value greater than or equal to the detection limit, report the value.

U Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g., 10U) based on necessary concentration/dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read: U-Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.

J Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but

C This flag applies to pesticide parameters where the identification has been confirmed by GC/MS. Single component pesticides ≥10 ng/ul in the final extract should be confirmed by GC/MS.

B This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

Other Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

Environmental Protection Agency   CLP Sample Management Office
P.O. Box 818   Alexandria, Virginia 22313   703/557-2490

Sample Number
JA5IE

Organics Analysis Data Sheet
(Page 2)

RLL
8/12/85

Semivolatile Compounds

Concentration: Low   Medium   (Circle One)

Date Extracted/Prepared: 7-10-85

Date Analyzed: 7-12-85

Conc/Dil Factor: 2

	CAS Number		ug/l or ug/Kg (Circle One)
61B	62-75-9	N-Nitrosodimethylamine	20 µ J
65A	108-95-2	Phenol	20 µ
	62-53-3	Aniline	20 µ
18B	111-44-4	bis(2-Chloroethyl)Ether	20 µ
24A	95-57-8	2-Chlorophenol	20 µ
26B	541-73-1	1,3-Dichlorobenzene	20 µ
27B	106-46-7	1,4-Dichlorobenzene	20 µ
	100-51-6	Benzyl Alcohol	20 µ
25B	95-50-1	1,2-Dichlorobenzene	20 µ
	95-48-7	2-Methylphenol	20 µ
42B	39638-32-9	bis(2-chloroisopropyl)Ether	20 µ
	106-44-5	4-Methylphenol	20 µ
63B	621-64-7	N-Nitroso-Di-n-Propylamine	20 µ
12B	67-72-1	Hexachloroethane	20 µ
56B	98-95-3	Nitrobenzene	20 µ
54B	78-59-1	Isophorone	20 µ
57A	88-75-5	2-Nitrophenol	20 µ
34A	105-67-9	2,4-Dimethylphenol	20 µ
	65-85-0	Benzoic Acid	20 µ
43B	111-91-1	bis(2-Chloroethoxy)Methane	20 µ
31A	120-83-2	2,4-Dichlorophenol	20 µ
8B	120-82-1	1,2,4-Trichlorobenzene	20 µ
55B	91-20-3	Naphthalene	20 µ
	106-47-8	4-Chloroaniline	20 µ
52B	87-68-3	Hexachlorobutadiene	20 µ
22A	59-50-7	4-Chloro-3-Methylphenol	20 µ
	91-57-6	2-Methylnaphthalene	20 µ
53B	77-47-4	Hexachlorocyclopentadiene	20 µ
21A	88-06-2	2,4,6-Trichlorophenol	20 µ
	95-95-4	2,4,5-Trichlorophenol	20 µ
20B	91-58-7	2-Chloronaphthalene	20 µ
	88-74-4	2-Nitroaniline	20 µ
71B	131-11-3	Dimethyl Phthalate	20 µ
77B	208-96-8	Acenaphthylene	20 µ
	99-09-2	3-Nitroaniline	20 µ

	CAS Number		ug/l or ug/Kg (Circle One)
1B	83-32-9	Acenaphthene	20 µ J
59A	51-28-5	2,4-Dinitrophenol	20 µ
58A	100-02-7	4-Nitrophenol	20 µ
	132-64-9	Dibenzofuran	20 µ
35B	121-14-2	2,4-Dinitrotoluene	20 µ
36B	606-20-2	2,6-Dinitrotoluene	20 µ
70B	84-66-2	Diethylphthalate	20 µ
40B	7005-72-3	4-Chlorophenyl-phenylether	20 µ
80B	86-73-7	Fluorene	20 µ
	100-01-6	4-Nitroaniline	20 µ
60A	534-52-1	4,6-Dinitro-2-Methylphenol	20 µ
62B	86-30-6	N-Nitrosodiphenylamine (1)	20 µ
41B	101-55-3	4-Bromophenyl-phenylether	20 µ
9B	118-74-1	Hexachlorobenzene	20 µ
64A	87-86-5	Pentachlorophenol	20 µ
81B	85-01-8	Phenanthrene	20 µ
78B	120-12-7	Anthracene	20 µ
68B	84-74-2	Di-n-Butylphthalate	20 µ
39B	206-44-0	Fluoranthene	20 µ
5B	92-87-5	Benzidine	20 µ
84B	129-00-0	Pyrene	20 µ
67B	85-68-7	Butylbenzylphthalate	20 µ
28B	91-94-1	3,3'-Dichlorobenzidine	20 µ
72B	56-55-3	Benzo(a)Anthracene	20 µ
66B	117-81-7	bis(2-Ethylhexyl)Phthalate	20 µ
76B	218-01-9	Chrysene	20 µ
69B	117-84-0	Di-n-Octyl Phthalate	20 µ
74B	205-99-2	Benzo(b)Fluoranthene	20 µ
75B	207-08-9	Benzo(k)Fluoranthene	20 µ
73B	50-32-8	Benzo(a)Pyrene	20 µ
83B	193-39-5	Indeno(1,2,3-cd)Pyrene	20 µ
82B	53-70-3	Dibenz(a,h)Anthracene	20 µ
79B	191-24-2	Benzo(g,h,i)Perylene	20 µ J

(1)-Cannot be separated from diphenylamine

4/84

Environmental Protection Agency CLP Sample Management Office
P O Box 818 Alexandria Virginia 22313 703/557-2490

Sample Number
JA515

Organics Analysis Data Sheet
(Page 3)

RPL
8/12/85

Pesticide/PCBs

Concentration Low Medium (Circle One)

Date Extracted/Prepared 6-24-85

Date Analyzed 7-3-85

Conc/Dil Factor. Dil=1

	CAS Number		ug/l or ug/Kg (Circle One)
102P	319-84-6	Alpha-BHC	0.1 U → ok
103P	319-85-7	Beta-BHC	0.1 U
104P	319-86-8	Delta-BHC	0.1 U
105P	58-89-9	Gamma-BHC (Lindane)	0.1 U
100P	76-44-8	Heptachlor	0.1 U
89P	309-00-2	Aldrin	0.1 U
101P	1024-57-3	Heptachlor Epoxide	0.1 U
	959-98-8	Endosulfan I	0.1 U
90P	60-57-1	Dieldrin	0.1 U
93P	72-55-9	4, 4'-DDE	0.1 U
98P	72-20-8	Endrin	0.1 U
	33213-65-9	Endosulfan II	0.1 U
94P	72-54-8	4, 4'-DDD	0.1 U
99P	7421-93-4	Endrin Aldehyde	0.1 U
97P	1031-07-8	Endosulfan Sulfate	0.1 U
92P	50-29-3	4, 4'-DDT	0.1 U
	72-43-5	Methoxychlor	0.2 U
	53494-70-5	Endrin Ketone	0.1 U
91P	57-74-9	Chlordane	0.2 U
113P	8001-35-2	Toxaphene	0.2 U
112P	12674-11-2	Aroclor-1016	0.2 U
109P	11104-28-2	Aroclor-1221	0.2 U
108P	11141-16-5	Aroclor-1232	0.2 U
106P	53469-21-9	Aroclor-1242	0.2 U
110P	12672-29-6	Aroclor-1248	0.2 U
107P	11097-69-1	Aroclor-1254	0.2 U
111P	11096-82-5	Aroclor-1260	0.2 U

V_i = Volume of extract injected (ul)

V_s = Volume of water extracted (ml)

W_s = Weight of sample extracted (g)

V_t = Volume of total extract (ul)

V_s 500 or W_s NA V_t 500 V_i 2.7

4/84

Environmental ... P.O. Box 818 Alexandria Virginia 22313 703/557-2490

JA514

Organics Analysis Data Sheet
(Page 1)

Laboratory Name ERCO/A Division of ENSECO

Case No 4565

Lab Sample ID No 17208

QC Report No 140

Sample Matrix Water

Contract No 68-01-7027

Data Release Authorized By JFM

Date Sample Received 6/24/85

RLS 8/12/85

Volatile Compounds

Concentration: Low Medium (Circle One)

Date Extracted/Prepared 7-1-85

Date Analyzed 7-1-85

Conc/Dil Factor 1 pH –

Percent Moisture –

Percent Moisture (Decanted) –

	CAS Number		ug/l or ug/Kg (Circle One)
8U	74-87-3	Chloromethane	10 u
KU	74-83-9	Bromomethane	10 u
19U	75-01-4	Vinyl Chloride	10 u
6U	75-00-3	Chloroethane	10 u
44U	75-09-2	Methylene Chloride	10 u
	67-64-1	Acetone	25 u
	75-15-0	Carbon Disulfide	10 u
19U	75-35-4	1, 1-Dichloroethene	10 u
13U	75-34-3	1, 1-Dichloroethane	10 u
20U	156-60-5	Trans-1, 2-Dichloroethene	10 u
3U	67-66-3	Chloroform	10 u
10U	107-06-2	1, 2-Dichloroethane	10 u
	78-93-3	2-Butanone	10 u
11U	71-55-6	1, 1, 1-Trichloroethane	10 u
6U	56-23-5	Carbon Tetrachloride	10 u
	108-05-4	Vinyl Acetate	10 u
48U	75-27-4	Bromodichloromethane	10 u

	CAS Number		ug/l or ug/Kg (Circle One)
15U	79-34-5	1, 1, 2, 2-Tetrachloroethane	10 u
37U	78-87-5	1, 2-Dichloropropene	10 u
33U	10061-02-6	Trans-1, 3-Dichloropropene	10 u
87U	79-01-6	Trichloroethene	10 u
51U	124-48-1	Dibromochloromethane	10 u
14U	79-00-5	1, 1, 2-Trichloroethane	10 u
4U	71-43-2	Benzene	10 u
	10061-01-5	cis-1, 3-Dichloropropene	10 u
19U	110-75-8	2-Chloroethylvinylether	10 u
47U	75-25-2	Bromoform	10 u
	591-78-6	2-Hexanone	10 u
	108-10-1	4-Methyl-2-Pentanone	10 u
25U	127-18-4	Tetrachloroethene	10 u
86U	108-88-3	Toluene	10 u
7U	108-90-7	Chlorobenzene	10 u
37U	100-41-4	Ethylbenzene	10 u
	100-42-5	Styrene	10 u
		Total Xylenes	10 u

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

Value If the result is a value greater than or equal to the detection limit, report the value.

U Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g. 10U) based on necessary concentration/dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read: U-Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.

J Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g. 10J).

C This flag applies to pesticide parameters where the identification has been confirmed by GC/MS. Single component pesticides ≥10 ng/ul in the final extract should be confirmed by GC/MS.

B This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

Other Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

K Indicates compound was detected and identified, but the concentration is below reporting detection limit.

Form I

4/84

Environmental Protection Agency   CLP Sample Management Office
P.O. Box 818, Alexandria, Virginia 22313 703/557-2490

Sample Number
JA519

Organics Analysis Data Sheet
(Page 2)

RE
8/12/85

Semivolatile Compounds

Concentration: Low   Medium   (Circle One)

Date Extracted/Prepared: 7-9-85

Date Analyzed: 7-11-85

Conc/Dil Factor: 2

	CAS Number		ug/l or ug/Kg (Circle One)
61B	62-75-9	N-Nitrosodimethylamine	20 u J
65A	108-95-2	Phenol	20 u
	62-53-3	Aniline	20 u
18B	111-44-4	bis(-2-Chloroethyl)Ether	20 u
24A	95-57-8	2-Chlorophenol	20 u
26B	541-73-1	1,3-Dichlorobenzene	20 u
27B	106-46-7	1,4-Dichlorobenzene	20 u
	100-51-6	Benzyl Alcohol	20 u
25B	95-50-1	1,2-Dichlorobenzene	20 u
	95-48-7	2-Methylphenol	20 u
42B	39638-32-9	bis(2-chloroisopropyl)Ether	20 u
	106-44-5	4-Methylphenol	20 u
63B	621-64-7	N-Nitroso-Di-n-Propylamine	20 u
12B	67-72-1	Hexachloroethane	20 u
56B	98-95-3	Nitrobenzene	20 u
54B	78-59-1	Isophorone	20 u
57A	88-75-5	2-Nitrophenol	20 u
34A	105-67-9	2,4-Dimethylphenol	20 u
	65-85-0	Benzoic Acid	20 u
43B	111-91-1	bis(-2-Chloroethoxy)Methane	20 u
31A	120-83-2	2,4-Dichlorophenol	20 u
8B	120-82-1	1,2,4-Trichlorobenzene	20 u
55B	91-20-3	Naphthalene	20 u
	106-47-8	4-Chloroaniline	20 u
52B	87-68-3	Hexachlorobutadiene	20 u
22A	59-50-7	4-Chloro-3-Methylphenol	20 u
	91-57-6	2-Methylnaphthalene	20 u
53B	77-47-4	Hexachlorocyclopentadiene	20 u
21A	88-06-2	2,4,6-Trichlorophenol	20 u
	95-95-4	2,4,5-Trichlorophenol	20 u
20B	91-58-7	2-Chloronaphthalene	20 u
	88-74-4	2-Nitroaniline	20 u
71B	131-11-3	Dimethyl Phthalate	20 u
77B	208-96-8	Acenaphthylene	20 u
	99-09-2	3-Nitroaniline	20 u J

	CAS Number		ug/l or ug/Kg (Circle One)
1B	83-32-9	Acenaphthene	20 u J
59A	51-28-5	2,4-Dinitrophenol	20 u
58A	100-02-7	4-Nitrophenol	20 u
	132-64-9	Dibenzofuran	20 u
35B	121-14-2	2,4-Dinitrotoluene	20 u
36B	606-20-2	2,6-Dinitrotoluene	20 u
70B	84-66-2	Diethylphthalate	20 u
40B	7005-72-3	4-Chlorophenyl-phenylether	20 u
80B	86-73-7	Fluorene	20 u
	100-01-6	4-Nitroaniline	20 u
60A	534-52-1	4,6-Dinitro-2-Methylphenol	20 u
62B	86-30-6	N-Nitrosodiphenylamine (1)	20 u
41B	101-55-3	4-Bromophenyl-phenylether	20 u
9B	118-74-1	Hexachlorobenzene	20 u
64A	87-86-5	Pentachlorophenol	20 u
81B	85-01-8	Phenanthrene	20 u
78B	120-12-7	Anthracene	20 u
68B	84-74-2	Di-n-Butylphthalate	20 u
39B	206-44-0	Fluoranthene	20 u
5B	92-87-5	Benzidine	20 u
84B	129-00-0	Pyrene	20 u
67B	85-68-7	Butylbenzylphthalate	20 u
28B	91-94-1	3,3'-Dichlorobenzidine	20 u
72B	56-55-3	Benzo(a)Anthracene	20 u
66B	117-81-7	bis(2-Ethylhexyl)Phthalate	20 u
76B	218-01-9	Chrysene	20 u
69B	117-84-0	Di-n-Octyl Phthalate	20 u
74B	205-99-2	Benzo(b)Fluoranthene	20 u
75B	207-08-9	Benzo(k)Fluoranthene	20 u
73B	50-32-8	Benzo(a)Pyrene	20 u
83B	193-39-5	Indeno(1,2,3-cd)Pyrene	20 u
82B	53-70-3	Dibenz(a,h)Anthracene	20 u
79B	191-24-2	Benzo(g,h,i)Perylene	20 u J

(1)-Cannot be separated from diphenylamine

Environmental Protection Agency CLP Sample Management Office
P O Box 818 Alexandria Virginia 22313 703/557-2490

Sample Number
JA 517

Organics Analysis Data Sheet
(Page 3)

AEL 8/12/85

Pesticide/PCBs

Concentration Low Medium (Circle One)

Date Extracted/Prepared 6-25-85

Date Analyzed 7-3-85

Conc/Dil Factor. diL=1

	CAS Number		ug/l or ug/Kg (Circle One)
102P	319-84-6	Alpha-BHC	0.1 U
103P	319-85-7	Beta-BHC	0.1 U
104P	319-86-8	Delta-BHC	0.1 U
105P	58-89-9	Gamma-BHC (Lindane)	0.1 U
100P	76-44-8	Heptachlor	0.1 U
89P	309-00-2	Aldrin	0.1 U
101P	1024-57-3	Heptachlor Epoxide	0.1 U
	959-98-8	Endosulfan I	0.1 U
90P	60-57-1	Dieldrin	0.1 U
93P	72-55-9	4,4-DDE	0.1 U
98P	72-20-8	Endrin	0.1 U
	33213-65-9	Endosulfan II	0.1 U
94P	72-54-8	4,4-DDD	0.1 U
99P	7421-93-4	Endrin Aldehyde	0.1 U
97P	1031-07-8	Endosulfan Sulfate	0.1 U
92P	50-29-3	4,4-DDT	0.1 U
	72-43-5	Methoxychlor	0.2 U
	53494-70-5	Endrin Ketone	0.1 U
91P	57-74-9	Chlordane	0.2 U
113P	8001-35-2	Toxaphene	0.2 U
112P	12674-11-2	Aroclor-1016	0.2 U
108P	11104-28-2	Aroclor-1221	0.2 U
109P	11141-16-5	Aroclor-1232	0.2 U
106P	53469-21-9	Aroclor-1242	0.2 U
110P	12672-29-6	Aroclor-1248	0.2 U
107P	11097-69-1	Aroclor-1254	0.2 U
111P	11096-82-5	Aroclor-1260	0.2 U

V_i = Volume of extract injected (ul)

V_s = Volume of water extracted (ml)

W_s = Weight of sample extracted (g)

V_t = Volume of total extract (ul)

V_s 500 or W_s NA V_t 500 V_i 2.7

Environmental Protection Agency CLP Sample Management Office
P O Box 818 Alexandria Virginia 22313 703/557-2490

Sample Number
JA520

Organics Analysis Data Sheet
(Page 1)

RES 8/1/85

Laboratory Name ERCO/A Division of ENSECO
Case No 4565
Lab Sample ID No 17214
QC Report No 140
Sample Matrix Water
Contract No 68-01-7027
Data Release Authorized By JFM
Date Sample Received 6/24/85

Volatile Compounds

Concentration: Low Medium (Circle One)

Date Extracted/Prepared 7-5-85

Date Analyzed 7-5-85

Conc/Dil Factor 1 pH –

Percent Moisture –

Percent Moisture (Decanted) –

* VOA Chromatogram and Quant Report for 7/1/85 included for time criteria only

CAS Number		ug/l or ug/Kg (Circle One)
74-87-3	Chloromethane	10 u J
74-83-9	Bromomethane	10 u
75-01-4	Vinyl Chloride	10 u
75-00-3	Chloroethane	10 u
75-09-2	Methylene Chloride	10 u
67-64-1	Acetone	25 u
75-15-0	Carbon Disulfide	10 u
75-35-4	1, 1-Dichloroethene	10 u
75-34-3	1, 1-Dichloroethane	10 u
156-60-5	Trans-1, 2-Dichloroethene	10 u
67-66-3	Chloroform	10 u
107-06-2	1, 2-Dichloroethane	10 u
78-93-3	2-Butanone	10 u
71-55-6	1, 1, 1-Trichloroethane	10 u
56-23-5	Carbon Tetrachloride	10 u
108-05-4	Vinyl Acetate	10 u
75-27-4	Bromodichloromethane	10 u

CAS Number		ug/l or ug/Kg (Circle One)
79-34-5	1, 1, 2, 2-Tetrachloroethane	10 u J
78-87-5	1, 2-Dichloropropane	10 u
10061-02-6	Trans-1, 3-Dichloropropene	10 u
79-01-6	Trichloroethene	10 u
124-48-1	Dibromochloromethane	10 u
79-00-5	1, 1, 2-Trichloroethane	10 u
71-43-2	Benzene	10 u
10061-01-5	cis-1, 3-Dichloropropene	10 u
110-75-8	2-Chloroethylvinylether	10 u
75-25-2	Bromoform	10 u
591-78-6	2-Hexanone	10 u
108-10-1	4-Methyl-2-Pentanone	10 u
127-18-4	Tetrachloroethene	10 u
108-88-3	Toluene	10 u
108-90-7	Chlorobenzene	10 u
100-41-4	Ethylbenzene	10 u
100-42-5	Styrene	10 u
	Total Xylenes	10 u

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

Value If the result is a value greater than or equal to the detection limit, report the value.

U Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g. 10U) based on necessary concentration/dilution action. (This is not necessarily the instrument detection limit.) The footnote should read: U-Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.

J Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but

C This flag applies to pesticide parameters where the identification has been confirmed by GC/MS. Single component pesticides ≥10 ng/ul in the final extract should be confirmed by GC/MS.

B This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

Other Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

K Indicates compound was detected and identified, but the concentration is below reporting detection limit.

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Environmental Protection Agency. CLP Sample Management Office
P.O Box 818. Alexandria Virginia 22313 703/557-2490

Sample Number
JA520

Organics Analysis Data Sheet
(Page 2)

REL 8/12/85

Semivolatile Compounds

Concentration: Low Medium (Circle One)

Date Extracted/Prepared 7-9-85

Date Analyzed 7-12-85

Conc/Dil Factor 2

	CAS Number		ug/l or ug/Kg (Circle One)
61B	62-75-9	N-Nitrosodimethylamine	20 u
65A	108-95-2	Phenol	20 u
	62-53-3	Aniline	20 u
18B	111-44-4	bis(-2-Chloroethyl)Ether	20 u
24A	95-57-8	2-Chlorophenol	20 u
26B	541-73-1	1, 3-Dichlorobenzene	20 u
27B	106-46-7	1, 4-Dichlorobenzene	20 u
	100-51-6	Benzyl Alcohol	20 u
25B	95-50-1	1, 2-Dichlorobenzene	20 u
	95-48-7	2-Methylphenol	20 u
42B	39638-32-9	bis(2-chloroisopropyl)Ether	20 u
	106-44-5	4-Methylphenol	20 u
63B	621-64-7	N-Nitroso-Di-n-Propylamine	20 u
12B	67-72-1	Hexachloroethane	20 u
56B	98-95-3	Nitrobenzene	20 u
54B	78-59-1	Isophorone	20 u
57A	88-75-5	2-Nitrophenol	20 u
34A	105-67-9	2, 4-Dimethylphenol	20 u
	65-85-0	Benzoic Acid	20 u
43B	111-91-1	bis(-2-Chloroethoxy)Methane	20 u
31A	120-83-2	2, 4-Dichlorophenol	20 u
8B	120-82-1	1, 2, 4-Trichlorobenzene	20 u
55B	91-20-3	Naphthalene	20 u
	106-47-8	4-Chloroaniline	20 u
52B	87-68-3	Hexachlorobutadiene	20 u
22A	59-50-7	4-Chloro-3-Methylphenol	20 u
	91-57-6	2-Methylnaphthalene	20 u
53B	77-47-4	Hexachlorocyclopentadiene	20 u
21A	88-06-2	2, 4, 6-Trichlorophenol	20 u
	95-95-4	2, 4, 5-Trichlorophenol	20 u
20B	91-58-7	2-Chloronaphthalene	20 u
	88-74-4	2-Nitroaniline	20 u
71B	131-11-3	Dimethyl Phthalate	20 u
77B	208-96-8	Acenaphthylene	20 u
	99-09-2	3-Nitroaniline	20 u

	CAS Number		ug/l or ug/Kg (Circle One)
1B	83-32-9	Acenaphthene	20 u
59A	51-28-5	2, 4-Dinitrophenol	20 u
58A	100-02-7	4-Nitrophenol	20 u
	132-64-9	Dibenzofuran	20 u
35B	121-14-2	2, 4-Dinitrotoluene	20 u
36B	606-20-2	2, 6-Dinitrotoluene	20 u
70B	84-66-2	Diethylphthalate	20 u
40B	7005-72-3	4-Chlorophenyl-phenylether	20 u
80B	86-73-7	Fluorene	20 u
	100-01-6	4-Nitroaniline	20 u
60A	534-52-1	4, 6-Dinitro-2-Methylphenol	20 u
62B	86-30-6	N-Nitrosodiphenylamine (1)	20 u
41B	101-55-3	4-Bromophenyl-phenylether	20 u
9B	118-74-1	Hexachlorobenzene	20 u
64A	87-86-5	Pentachlorophenol	20 u
81B	85-01-8	Phenanthrene	20 u
78B	120-12-7	Anthracene	20 u
68B	84-74-2	Di-n-Butylphthalate	20 u
39B	206-44-0	Fluoranthene	20 u
5B	92-87-5	Benzidine	20 u
84B	129-00-0	Pyrene	20 u
67B	85-68-7	Butylbenzylphthalate	20 u
28B	91-94-1	3, 3'-Dichlorobenzidine	20 u
72B	56-55-3	Benzo(a)Anthracene	20 u
66B	117-81-7	bis(2-Ethylhexyl)Phthalate	20 u
76B	218-01-9	Chrysene	20 u
69B	117-84-0	Di-n-Octyl Phthalate	20 u
74B	205-99-2	Benzo(b)Fluoranthene	20 u
75B	207-08-9	Benzo(k)Fluoranthene	20 u
73B	50-32-8	Benzo(a)Pyrene	20 u
83B	193-39-5	Indeno(1, 2, 3-cd)Pyrene	20 u
82B	53-70-3	Dibenz(a, h)Anthracene	20 u
79B	191-24-2	Benzo(g, h, i)Perylene	20 u

(1)-Cannot be separated from diphenylamine

4/84

Environmental Protection Agency. CLP Sample Management Office
P O Box 818 Alexandria Virginia 22313 703/557-2490

Sample Number
JA520

RLL 8/12/85

Organics Analysis Data Sheet
(Page 3)

Pesticide/PCBs

Concentration: Low Medium (Circle One)

Date Extracted/Prepared 6-21-85

Date Analyzed 7-3-85

Conc/Dil Factor. dil=1

	CAS Number		ug/l or ug/Kg (Circle One)
102P	319-84-6	Alpha-BHC	0.1 U — ck
103P	319-85-7	Beta-BHC	0.1 U
104P	319-86-8	Delta-BHC	0.1 U
105P	58-89-9	Gamma-BHC (Lindane)	0.1 U
100P	76-44-8	Heptachlor	0.1 U
89P	309-00-2	Aldrin	0.1 U
101P	1024-57-3	Heptachlor Epoxide	0.1 U
	959-98-8	Endosulfan I	0.1 U
90P	60-57-1	Dieldrin	0.1 U
93P	72-55-9	4 4 -DDE	0.1 U
98P	72-20-8	Endrin	0.1 U
	33213-65-9	Endosulfan II	0.1 U
94P	72-54-8	4 4 -DDD	0.1 U
99P	7421-93-4	Endrin Aldehyde	0.1 U
97P	1031-07-8	Endosulfan Sulfate	0.1 U
92P	50-29-3	4 4 -DDT	0.1 U
	72-43-5	Methoxychlor	0.2 U
	53494-70-5	Endrin Ketone	0.1 U
91P	57-74-9	Chlordane	0.2 U
113P	8001-35-2	Toxaphene	0.2 U
117P	12674-11-2	Aroclor-1016	0.2 U
108P	11104-28-2	Aroclor-1221	0.2 U
109P	11141-16-5	Aroclor-1232	0.2 U
106P	53469-21-9	Aroclor-1242	0.2 U
110P	12672-29-6	Aroclor-1248	0.2 U
107P	11097-69-1	Aroclor-1254	0.2 U
111P	11096-82-5	Aroclor-1260	0.2 U

V_i = Volume of extract injected (ul)

V_s = Volume of water extracted (ml)

W_s = Weight of sample extracted (g)

V_t = Volume of total extract (ul)

V_s 500 or W_s NA V_t 500 V_i 2.7

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JA 521

Organics Analysis Data Sheet
(Page 1)

Laboratory Name ERCO/A Division of ENSECO

Case No 4565

Lab Sample ID No 17212

QC Report No 140

Sample Matrix: Water

Contract No 68-01-7027

Data Release Authorized By JFM

Date Sample Received 6/24/85

Volatile Compounds

REA 8/12/85

Concentration: Low Medium (Circle One)

Date Extracted/Prepared 7-1-85

Date Analyzed 7-1-85

Conc/Dil Factor: 1 pH —

Percent Moisture —

Percent Moisture (Decanted) —

	CAS Number		ug/l or ug/Kg (Circle One)
U	74-87-3	Chloromethane	10 U
U	74-83-9	Bromomethane	10 U
8U	75-01-4	Vinyl Chloride	10 U
U	75-00-3	Chloroethane	10 U
U	75-09-2	Methylene Chloride	10 U
	67-64-1	Acetone	25 U
	75-15-0	Carbon Disulfide	10 U
U	75-35-4	1, 1-Dichloroethene	10 U
13U	75-34-3	1, 1-Dichloroethane	10 U
U	156-60-5	Trans-1, 2-Dichloroethene	10 U
U	67-66-3	Chloroform	10 U
10U	107-06-2	1, 2-Dichloroethane	10 U
	78-93-3	2-Butanone	10 U
1U	71-55-6	1, 1, 1-Trichloroethane	10 U
6U	56-23-5	Carbon Tetrachloride	10 U
	108-05-4	Vinyl Acetate	10 U
17U	75-27-4	Bromodichloromethane	10 U

	CAS Number		ug/l or ug/Kg (Circle One)
15U	79-34-5	1, 1, 2, 2-Tetrachloroethane	10 U
37U	78-87-5	1, 2-Dichloropropane	10 U
33U	10061-02-6	Trans-1, 3-Dichloropropene	10 U
87U	79-01-6	Trichloroethene	10 U
51U	124-48-1	Dibromochloromethane	10 U
14U	79-00-5	1, 1, 2-Trichloroethane	10 U
4U	71-43-2	Benzene	10 U
	10061-01-5	cis-1, 3-Dichloropropene	10 U
19U	110-75-8	2-Chloroethylvinylether	10 U
47U	75-25-2	Bromoform	10 U
	591-78-6	2-Hexanone	10 U
	108-10-1	4-Methyl-2-Pentanone	10 U
85U	127-18-4	Tetrachloroethene	10 U
86U	108-88-3	Toluene	10 U
7U	108-90-7	Chlorobenzene	10 U
38U	100-41-4	Ethylbenzene	10 U
	100-42-5	Styrene	10 U
		Total Xylenes	10 U

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

Value If the result is a value greater than or equal to the detection limit, report the value.

U Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g. 10U) based on necessary concentration/dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read: U-Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.

J Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g. 10J).

C This flag applies to pesticide parameters where the identification has been confirmed by GC/MS. Single component pesticides ≥10 ng/ul in the final extract should be confirmed by GC/MS.

B This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

Other Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

K Indicates compound was detected and identified, but the concentration is below reporting detection limit.

Environmental Protection Agency. CLP Sample Management Office.
P. O. Box 818. Alexandria, Virginia 22313 703/557-2490

Sample Number
JA521

Organics Analysis Data Sheet
(Page 2)

Rll
8/12/85

Semivolatile Compounds

*Concentration: Low Medium (Circle One)

Date Extracted/Prepared: 7-9-85

Date Analyzed: 7-12-85

Conc/Dil Factor: 2

	CAS Number		ug/l or ug/Kg (Circle One)
61B	62-75-9	N-Nitrosodimethylamine	20 u
65A	108-95-2	Phenol	20 u
	62-53-3	Aniline	20 u
18B	111-44-4	bis(-2-Chloroethyl)Ether	20 u
24A	95-57-8	2-Chlorophenol	20 u
26B	541-73-1	1, 3-Dichlorobenzene	20 u
27B	106-46-7	1, 4-Dichlorobenzene	20 u
	100-51-6	Benzyl Alcohol	20 u
25B	95-50-1	1, 2-Dichlorobenzene	20 u
	95-48-7	2-Methylphenol	20 u
42B	39638-32-9	bis(2-chloroisopropyl)Ether	20 u
	106-44-5	4-Methylphenol	20 u
63B	621-64-7	N-Nitroso-Di-n-Propylamine	20 u
12B	67-72-1	Hexachloroethane	20 u
56B	98-95-3	Nitrobenzene	20 u
54B	78-59-1	Isophorone	20 u
57A	88-75-5	2-Nitrophenol	20 u
34A	105-67-9	2, 4-Dimethylphenol	20 u
	65-85-0	Benzoic Acid	20 u
43B	111-91-1	bis(-2-Chloroethoxy)Methane	20 u
31A	120-83-2	2, 4-Dichlorophenol	20 u
8B	120-82-1	1, 2, 4-Trichlorobenzene	20 u
55B	91-20-3	Naphthalene	20 u
	106-47-8	4-Chloroaniline	20 u
52B	87-68-3	Hexachlorobutadiene	20 u
22A	59-50-7	4-Chloro-3-Methylphenol	20 u
	91-57-6	2-Methylnaphthalene	20 u
53B	77-47-4	Hexachlorocyclopentadiene	20 u
21A	88-06-2	2, 4, 6-Trichlorophenol	20 u
	95-95-4	2, 4, 5-Trichlorophenol	20 u
20B	91-58-7	2-Chloronaphthalene	20 u
	88-74-4	2-Nitroaniline	20 u
71B	131-11-3	Dimethyl Phthalate	20 u
77B	208-96-8	Acenaphthylene	20 u
	99-09-2	3-Nitroaniline	20 u

	CAS Number		ug/l or ug/Kg (Circle One)
1B	83-32-9	Acenaphthene	20 u
59A	51-28-5	2, 4-Dinitrophenol	20 u
58A	100-02-7	4-Nitrophenol	20 u
	132-64-9	Dibenzofuran	20 u
35B	121-14-2	2, 4-Dinitrotoluene	20 u
36B	606-20-2	2, 6-Dinitrotoluene	20 u
70B	84-66-2	Diethylphthalate	20 u
40B	7005-72-3	4-Chlorophenyl-phenylether	20 u
80B	86-73-7	Fluorene	20 u
	100-01-6	4-Nitroaniline	20 u
60A	534-52-1	4, 6-Dinitro-2-Methylphenol	20 u
62B	86-30-6	N-Nitrosodiphenylamine (1)	20 u
41B	101-55-3	4-Bromophenyl-phenylether	20 u
9B	118-74-1	Hexachlorobenzene	20 u
64A	87-86-5	Pentachlorophenol	20 u
81B	85-01-8	Phenanthrene	20 u
78B	120-12-7	Anthracene	20 u
68B	84-74-2	Di-n-Butylphthalate	20 u
39B	206-44-0	Fluoranthene	20 u
5B	92-87-5	Benzidine	20 u
84B	129-00-0	Pyrene	20 u
67B	85-68-7	Butylbenzylphthalate	20 u
28B	91-94-1	3, 3'-Dichlorobenzidine	20 u
72B	56-55-3	Benzo(a)Anthracene	20 u
66B	117-81-7	bis(2-Ethylhexyl)Phthalate	20 u
76B	218-01-9	Chrysene	20 u
69B	117-84-0	Di-n-Octyl Phthalate	20 u
74B	205-99-2	Benzo(b)Fluoranthene	20 u
75B	207-08-9	Benzo(k)Fluoranthene	20 u
73B	50-32-8	Benzo(a)Pyrene	20 u
83B	193-39-5	Indeno(1, 2, 3-cd)Pyrene	20 u
82B	53-70-3	Dibenz(a, h)Anthracene	20 u
79B	191-24-2	Benzo(g, h, i)Perylene	20 u

(1)-Cannot be separated from diphenylamine

4/84

Environmental Protection Agency. CLP Sample Management Office.
P.O Box 818. Alexandria Virginia 22313 703/557-2490

Sample Number
JA521

Organics Analysis Data Sheet
(Page 3)

REA
8/12/85

Pesticide/PCBs

Concentration: Low Medium (Circle One)

Date Extracted/Prepared 6-25-85

Date Analyzed 7-3-85

Conc/Dil Factor: dil=1

	CAS Number		ug/l or ug/Kg (Circle One)
101P	319-84-6	Alpha-BHC	0.1 u
103P	319-85-7	Beta-BHC	0.1 u
104P	319-86-8	Delta-BHC	0.1 u
105P	58-89-9	Gamma-BHC (Lindane)	0.1 u
100P	76-44-8	Heptachlor	0.1 u
99P	309-00-2	Aldrin	0.1 u
101P	1024-57-3	Heptachlor Epoxide	0.1 u
	959-98-8	Endosulfan I	0.1 u
90P	60-57-1	Dieldrin	0.1 u
93P	72-55-9	4,4'-DDE	0.1 u
98P	72-20-8	Endrin	0.1 u
	33213-65-9	Endosulfan II	0.1 u
94P	72-54-8	4,4'-DDD	0.1 u
99P	7421-93-4	Endrin Aldehyde	0.1 u
97P	1031-07-8	Endosulfan Sulfate	0.1 u
92P	50-29-3	4,4'-DDT	0.1 u
	72-43-5	Methoxychlor	0.2 u
	53494-70-5	Endrin Ketone	0.1 u
91P	57-74-9	Chlordane	0.2 u
113P	8001-35-2	Toxaphene	0.2 u
112P	12674-11-2	Aroclor-1016	0.2 u
108P	11104-28-2	Aroclor-1221	0.2 u
109P	11141-16-5	Aroclor-1232	0.2 u
106P	53469-21-9	Aroclor-1242	0.2 u
110P	12672-29-6	Aroclor-1248	0.2 u
107P	11097-69-1	Aroclor-1254	0.2 u
111P	11096-82-5	Aroclor-1260	0.2 u

V_i = Volume of extract injected (ul)

V_s = Volume of water extracted (ml)

W_s = Weight of sample extracted (g)

V_t = Volume of total extract (ul)

V_s 500 or W_s NA V_t 500 V_i 2.7

P. O. Box 818 Alexandria Virginia 22313 703/557-2490

JA522

Organics Analysis Data Sheet
(Page 1)

Laboratory Name: ERCO/A Division of ENSECO

Lab Sample ID No: 17211

Sample Matrix: water

Data Release Authorized By: JFM

Case No: 4565

QC Report No: 140

Contract No: 68-01-7027

Date Sample Received: 6/24/85

RH
8/12/85

Volatile Compounds

Concentration: Low Medium (Circle One)

Date Extracted/Prepared: 7-1-85

Date Analyzed: 7-1-85

Conc/Dil Factor: 1 pH: -

Percent Moisture: -

Percent Moisture (Decanted): -

CAS Number		ug/l or ug/Kg (Circle One)
74-87-3	Chloromethane	10 u
74-83-9	Bromomethane	10 u
75-01-4	Vinyl Chloride	10 u
75-00-3	Chloroethane	10 u
75-09-2	Methylene Chloride	10 u
67-64-1	Acetone	25 u
75-15-0	Carbon Disulfide	10 u
75-35-4	1, 1-Dichloroethene	10 u
75-34-3	1, 1-Dichloroethane	10 u
156-60-5	Trans-1, 2-Dichloroethene	10 u
67-66-3	Chloroform	10 u
107-06-2	1, 2-Dichloroethane	10 u
78-93-3	2-Butanone	10 u
71-55-6	1, 1, 1-Trichloroethane	10 u
56-23-5	Carbon Tetrachloride	10 u
108-05-4	Vinyl Acetate	10 u
75-27-4	Bromodichloromethane	10 u

CAS Number		ug/l or ug/Kg (Circle One)
79-34-5	1, 1, 2, 2-Tetrachloroethane	10 u
78-87-5	1, 2-Dichloropropane	10 u
10061-02-6	Trans-1, 3-Dichloropropene	10 u
79-01-6	Trichloroethene	10 u
124-48-1	Dibromochloromethane	10 u
79-00-5	1, 1, 2-Trichloroethane	10 u
71-43-2	Benzene	10 u
10061-01-5	cis-1, 3-Dichloropropene	10 u
110-75-8	2-Chloroethylvinylether	10 u
75-25-2	Bromoform	10 u
591-78-6	2-Hexanone	10 u
108-10-1	4-Methyl-2-Pentanone	10 u
127-18-4	Tetrachloroethene	10 u
108-88-3	Toluene	10 u
108-90-7	Chlorobenzene	10 u
100-41-4	Ethylbenzene	10 u
100-42-5	Styrene	10 u
	Total Xylenes	10 u

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

Value If the result is a value greater than or equal to the detection limit, report the value.

U Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g. 10U) based on necessary concentration/dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read: U-Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.

J Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g. 10J).

C This flag applies to pesticide parameters where the identification has been confirmed by GC/MS. Single component pesticides ≥10 ng/ul in the final extract should be confirmed by GC/MS.

B This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

Other Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

K Indicates compound was detected and identified, but the concentration is below reporting detection limit.

Environmental Protection Agency. CLP Sample Management Office
P.O Box 818. Alexandria. Virginia 22313 703/557-2490

Sample Number
JA 522

Organics Analysis Data Sheet
(Page 2)

REL
8/12/85

Semivolatile Compounds

Concentration: Low Medium (Circle One)

Date Extracted/Prepared: 7-9-85

Date Analyzed: 7-12-85

Conc/Dil Factor: 2

CAS Number		ug/l or ug/Kg (Circle One)
62-75-9	N-Nitrosodimethylamine	20 u J
108-95-2	Phenol	20 u
62-53-3	Aniline	20 u
111-44-4	bis(-2-Chloroethyl)Ether	20 u
95-57-8	2-Chlorophenol	20 u
541-73-1	1,3-Dichlorobenzene	20 u
106-46-7	1,4-Dichlorobenzene	20 u
100-51-6	Benzyl Alcohol	20 u
95-50-1	1,2-Dichlorobenzene	20 u
95-48-7	2-Methylphenol	20 u
39638-32-9	bis(2-chloroisopropyl)Ether	20 u
106-44-5	4-Methylphenol	20 u
621-64-7	N-Nitroso-Di-n-Propylamine	20 u
67-72-1	Hexachloroethane	20 u
98-95-3	Nitrobenzene	20 u
78-59-1	Isophorone	20 u
88-75-5	2-Nitrophenol	20 u
105-67-9	2,4-Dimethylphenol	20 u
65-85-0	Benzoic Acid	20 u
111-91-1	bis(-2-Chloroethoxy)Methane	20 u
120-83-2	2,4-Dichlorophenol	20 u
120-82-1	1,2,4-Trichlorobenzene	20 u
91-20-3	Naphthalene	20 u
106-47-8	4-Chloroaniline	20 u
87-68-3	Hexachlorobutadiene	20 u
59-50-7	4-Chloro-3-Methylphenol	20 u
91-57-6	2-Methylnaphthalene	20 u
77-47-4	Hexachlorocyclopentadiene	20 u
88-06-2	2,4,6-Trichlorophenol	20 u
95-95-4	2,4,5-Trichlorophenol	20 u
91-58-7	2-Chloronaphthalene	20 u
88-74-4	2-Nitroaniline	20 u
131-11-3	Dimethyl Phthalate	20 u
208-96-8	Acenaphthylene	20 u
99-09-2	3-Nitroaniline	20 u

CAS Number		ug/l or ug/Kg (Circle One)
83-32-9	Acenaphthene	20 u J
51-28-5	2,4-Dinitrophenol	20 u
100-02-7	4-Nitrophenol	20 u
132-64-9	Dibenzofuran	20 u
121-14-2	2,4-Dinitrotoluene	20 u
606-20-2	2,6-Dinitrotoluene	20 u
84-66-2	Diethylphthalate	20 u
7005-72-3	4-Chlorophenyl-phenylether	20 u
86-73-7	Fluorene	20 u
100-01-6	4-Nitroaniline	20 u
534-52-1	4,6-Dinitro-2-Methylphenol	20 u
86-30-6	N-Nitrosodiphenylamine (1)	20 u
101-55-3	4-Bromophenyl-phenylether	20 u
118-74-1	Hexachlorobenzene	20 u
87-86-5	Pentachlorophenol	20 u
85-01-8	Phenanthrene	20 u
120-12-7	Anthracene	20 u
84-74-2	Di-n-Butylphthalate	20 u
206-44-0	Fluoranthene	20 u
92-87-5	Benzidine	20 u
129-00-0	Pyrene	20 u
85-68-7	Butylbenzylphthalate	20 u
91-94-1	3,3'-Dichlorobenzidine	20 u
56-55-3	Benzo(a)Anthracene	20 u
117-81-7	bis(2-Ethylhexyl)Phthalate	20 u
218-01-9	Chrysene	20 u
117-84-0	Di-n-Octyl Phthalate	20 u
205-99-2	Benzo(b)Fluoranthene	20 u
207-08-9	Benzo(k)Fluoranthene	20 u
50-32-8	Benzo(a)Pyrene	20 u
193-39-5	Indeno(1,2,3-cd)Pyrene	20 u
53-70-3	Dibenz(a,h)Anthracene	20 u
191-24-2	Benzo(g,h,i)Perylene	20 u

(1)-Cannot be separated from diphenylamine

4/84

Environmental Protection Agency. CLP Sample Management Office.
P. O. Box 818. Alexandria. Virginia 22313 703/557-2490

Sample Number
JA522

Organics Analysis Data Sheet
(Page 3)

REL 8/1?/85

Pesticide/PCBs

Concentration: Low Medium (Circle One)

Date Extracted/Prepared 6-25-85

Date Analyzed 7-3-85

Conc/Dil Factor: dil <1

	CAS Number		ug/l or ug/Kg (Circle One)
102P	319-84-6	Alpha-BHC	0.1 U
103P	319-85-7	Beta-BHC	0.1 U
104P	319-86-8	Delta-BHC	0.1 U
105P	58-89-9	Gamma-BHC (Lindane)	0.1 U
100P	76-44-8	Heptachlor	0.1 U
99P	309-00-2	Aldrin	0.1 U
101P	1024-57-3	Heptachlor Epoxide	0.1 U
	959-98-8	Endosulfan I	0.1 U
90P	60-57-1	Dieldrin	0.1 U
93P	72-55-9	4, 4'-DDE	0.1 U
98P	72-20-8	Endrin	0.1 U
	33213-65-9	Endosulfan II	0.1 U
94P	72-54-8	4, 4'-DDD	0.1 U
99P	7421-93-4	Endrin Aldehyde	0.1 U
97P	1031-07-8	Endosulfan Sulfate	0.1 U
92P	50-29-3	4, 4'-DDT	0.1 U
	72-43-5	Methoxychlor	0.2 U
	53494-70-5	Endrin Ketone	0.1 U
91P	57-74-9	Chlordane	0.2 U
113P	8001-35-2	Toxaphene	0.2 U
112P	12674-11-2	Aroclor-1016	0.2 U
109P	11104-28-2	Aroclor-1221	0.2 U
108P	11141-16-5	Aroclor-1232	0.2 U
106P	53469-21-9	Aroclor-1242	0.2 U
110P	12672-29-6	Aroclor-1248	0.2 U
107P	11097-69-1	Aroclor-1254	0.2 U
111P	11096-82-5	Aroclor-1260	0.2 U

V_i = Volume of extract injected (ul)

V_s = Volume of water extracted (ml)

W_s = Weight of sample extracted (g)

V_t = Volume of total extract (ul)

V_s 500 or W_s NA V_t 500 V_i 2.7

4/84

Environmental Protection Agency ... P.O. Box 818 Alexandria Virginia 22313 703/557-2490

JA523

RKL 8/12/85

Organics Analysis Data Sheet
(Page 1)

Laboratory Name: ERCO/A Division of ENSECO

Case No: 4565

Lab Sample ID No: 17213

QC Report No: 140

Sample Matrix: Water

Contract No: 68-01-7027

Data Release Authorized By: JFM

Date Sample Received: 6/24/85

Volatile Compounds

Concentration: Low Medium (Circle One)

Date Extracted/Prepared: 7-5-85

Date Analyzed: 7-5-85

Conc/Dil Factor: 1 pH: –

Percent Moisture: –

Percent Moisture (Decanted): –

☆ VOA Chromatogram and Quant Report for 7/1/85 included for time criteria only.

CAS Number		ug/l or ug/Kg (Circle One)
74-87-3	Chloromethane	10 u J
74-83-9	Bromomethane	10 u |
75-01-4	Vinyl Chloride	10 u |
75-00-3	Chloroethane	10 u |
75-09-2	Methylene Chloride	10 u |
67-64-1	Acetone	25 u |
75-15-0	Carbon Disulfide	10 u |
75-35-4	1, 1-Dichloroethene	10 u |
75-34-3	1, 1-Dichloroethane	10 u |
156-60-5	Trans-1, 2-Dichloroethene	10 u |
67-66-3	Chloroform	10 u |
107-06-2	1, 2-Dichloroethane	10 u |
78-93-3	2-Butanone	10 u |
71-55-6	1, 1, 1-Trichloroethane	10 u |
56-23-5	Carbon Tetrachloride	10 u |
108-05-4	Vinyl Acetate	10 u |
75-27-4	Bromodichloromethane	10 u V

	CAS Number		ug/l or ug/Kg (Circle One)
15V	79-34-5	1, 1, 2, 2-Tetrachloroethane	10 u J
32V	78-87-5	1, 2-Dichloropropane	10 u |
33V	10061-02-6	Trans-1, 3-Dichloropropene	10 u |
87V	79-01-6	Trichloroethene	10 u |
51V	124-48-1	Dibromochloromethane	10 u |
14V	79-00-5	1, 1, 2-Trichloroethane	10 u |
4V	71-43-2	Benzene	10 u |
	10061-01-5	cis-1, 3-Dichloropropene	10 u |
19V	110-75-8	2-Chloroethylvinylether	10 u |
47V	75-25-2	Bromoform	10 u |
	591-78-6	2-Hexanone	10 u |
	108-10-1	4-Methyl-2-Pentanone	10 u |
85V	127-18-4	Tetrachloroethene	10 u |
86V	108-88-3	Toluene	10 u |
7V	108-90-7	Chlorobenzene	10 u |
38V	100-41-4	Ethylbenzene	10 u |
	100-42-5	Styrene	10 u |
		Total Xylenes	10 u V

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

Value If the result is a value greater than or equal to the detection limit, report the value.

U Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g. 10U) based on necessary concentration/dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read: U-Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.

J Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g. 10J).

C This flag applies to pesticide parameters where the identification has been confirmed by GC/MS. Single component pesticides ≥10 ng/ul in the final extract should be confirmed by GC/MS.

B This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

Other Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

K Indicates compound was detected and identified, but the concentration is below reporting detection limit.

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Environmental Protection Agency. CLP Sample Management Office.
P. O Box 818. Alexandria, Virginia 22313 703/557-2490

Sample Number
JA523

Organics Analysis Data Sheet
(Page 2)

AEA 8/12/85

Semivolatile Compounds

Concentration: Low Medium (Circle One)

Date Extracted/Prepared: 7-9-85

Date Analyzed: 7-12-85

Conc/Dil Factor: 2

	CAS Number		ug/l or ug/Kg (Circle One)
61B	62-75-9	N-Nitrosodimethylamine	20 µ J
5A	108-95-2	Phenol	20 µ
	62-53-3	Aniline	20 µ
18B	111-44-4	bis(-2-Chloroethyl)Ether	20 µ
24A	95-57-8	2-Chlorophenol	20 µ
26B	541-73-1	1, 3-Dichlorobenzene	20 µ
27B	106-46-7	1, 4-Dichlorobenzene	20 µ
	100-51-6	Benzyl Alcohol	20 µ
25B	95-50-1	1, 2-Dichlorobenzene	20 µ
	95-48-7	2-Methylphenol	20 µ
42B	39638 32-9	bis(2-chloroisopropyl)Ether	20 µ
	106-44-5	4-Methylphenol	20 µ
63B	621-64-7	N-Nitroso-Di-n-Propylamine	20 µ
12B	67-72-1	Hexachloroethane	20 µ
56B	98-95-3	Nitrobenzene	20 µ
54B	78-59-1	Isophorone	20 µ
57A	88-75-5	2-Nitrophenol	20 µ
34A	105-67-9	2, 4-Dimethylphenol	20 µ
	65-85-0	Benzoic Acid	20 µ
43B	111-91-1	bis(-2-Chloroethoxy)Methane	20 µ
31A	120-83-2	2, 4-Dichlorophenol	20 µ
8B	120-82-1	1, 2, 4-Trichlorobenzene	20 µ
55B	91-20-3	Naphthalene	20 µ
	106-47-8	4-Chloroaniline	20 µ
52B	87-68-3	Hexachlorobutadiene	20 µ
22A	59-50-7	4-Chloro-3-Methylphenol	20 µ
	91-57-6	2-Methylnaphthalene	20 µ
53B	77-47-4	Hexachlorocyclopentadiene	20 µ
21A	88-06-2	2, 4, 6-Trichlorophenol	20 µ
	95-95-4	2, 4, 5-Trichlorophenol	20 µ
20B	91-58-7	2-Chloronaphthalene	20 µ
	88-74-4	2-Nitroaniline	20 µ
71B	131-11-3	Dimethyl Phthalate	20 µ
77B	208-96-8	Acenaphthylene	20 µ
	99-09-2	3-Nitroaniline	20 µ

	CAS Number		ug/l or ug/Kg (Circle One)
1B	83-32-9	Acenaphthene	20 µ J
59A	51-28-5	2, 4-Dinitrophenol	20 µ
58A	100-02-7	4-Nitrophenol	20 µ
	132-64-9	Dibenzofuran	20 µ
35B	121-14-2	2, 4-Dinitrotoluene	20 µ
36B	606-20-2	2, 6-Dinitrotoluene	20 µ
70B	84-66-2	Diethylphthalate	20 µ
40B	7005-72-3	4-Chlorophenyl-phenylether	20 µ
80B	86-73-7	Fluorene	20 µ
	100-01-6	4-Nitroaniline	20 µ
60A	534-52-1	4, 6-Dinitro-2-Methylphenol	20 µ
62B	86-30-6	N-Nitrosodiphenylamine (1)	20 µ
41B	101-55-3	4-Bromophenyl-phenylether	20 µ
9B	118-74-1	Hexachlorobenzene	20 µ
64A	87-86-5	Pentachlorophenol	20 µ
81B	85-01-8	Phenanthrene	20 µ
78B	120-12-7	Anthracene	20 µ
68B	84-74-2	Di-n-Butylphthalate	20 µ
39B	206-44-0	Fluoranthene	20 µ
5B	92-87-5	Benzidine	20 µ
84B	129-00-0	Pyrene	20 µ
67B	85-68-7	Butylbenzylphthalate	20 µ
28B	91-94-1	3, 3'-Dichlorobenzidine	20 µ
72B	56-55-3	Benzo(a)Anthracene	20 µ
66B	117-81-7	bis(2-Ethylhexyl)Phthalate	20 µ
76B	218-01-9	Chrysene	20 µ
69B	117-84-0	Di-n-Octyl Phthalate	20 µ
74B	205-99-2	Benzo(b)Fluoranthene	20 µ
75B	207-08-9	Benzo(k)Fluoranthene	20 µ
73B	50-32-8	Benzo(a)Pyrene	20 µ
83B	193-39-5	Indeno(1, 2, 3-cd)Pyrene	20 µ
82B	53-70-3	Dibenz(a, h)Anthracene	20 µ
79B	191-24-2	Benzo(g, h, i)Perylene	20 µ

(1)-Cannot be separated from diphenylamine

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Environmental Protection Agency, CLP Sample Management Office
P.O. Box 818, Alexandria Virginia 22313 703/557-2490

Sample Number
JA 523

Organics Analysis Data Sheet
(Page 3)

REL 8/12/85

Pesticide/PCBs

Concentration: Low Medium (Circle One)

Date Extracted/Prepared 6-24-85

Date Analyzed 7-3-85

Conc/Dil Factor: dil = 1

	CAS Number		ug/l or ug/Kg (Circle One)
102P	319-84-6	Alpha-BHC	0.1 u
103P	319-85-7	Beta-BHC	0.1 u
104P	319-86-8	Delta-BHC	0.1 u
105P	58-89-9	Gamma-BHC (Lindane)	0.1 u
100P	76-44-8	Heptachlor	0.1 u
89P	309-00-2	Aldrin	0.1 u
101P	1024-57-3	Heptachlor Epoxide	0.1 u
	959-98-8	Endosulfan I	0.1 u
90P	60-57-1	Dieldrin	0.1 u
93P	72-55-9	4, 4'-DDE	0.1 u
98P	72-20-8	Endrin	0.1 u
	33213-65-9	Endosulfan II	0.1 u
94P	72-54-8	4, 4'-DDD	0.1 u
99P	7421-93-4	Endrin Aldehyde	0.1 u
97P	1031-07-8	Endosulfan Sulfate	0.1 u
92P	50-29-3	4, 4'-DDT	0.1 u
	72-43-5	Methoxychlor	0.2 u
	53494-70-5	Endrin Ketone	0.1 u
91P	57-74-9	Chlordane	0.2 u
113P	8001-35-2	Toxaphene	0.2 u
112P	12674-11-2	Aroclor-1016	0.2 u
108P	11104-28-2	Aroclor-1221	0.2 u
109P	11141-16-5	Aroclor-1232	0.2 u
106P	53469-21-9	Aroclor-1242	0.2 u
110P	12672-29-6	Aroclor-1248	0.2 u
107P	11097-69-1	Aroclor-1254	0.2 u
111P	11096-82-5	Aroclor-1260	0.2 u

V_i = Volume of extract injected (ul)

V_s = Volume of water extracted (ml)

W_s = Weight of sample extracted (g)

V_t = Volume of total extract (ul)

V_s 500 or W_s NA V_t .500 V_i 2.7

P. O. Box 818 Alexandria, Virginia 22313 703/557-2490

JA524

Organics Analysis Data Sheet
(Page 1)

Laboratory Name: ERCO/A Division of ENSECO
Case No: 4565
Lab Sample ID No: 17210
QC Report No: 140
Sample Matrix: Water
Contract No: 68-01-7027
Data Release Authorized By: JFM
Date Sample Received: 6-24-85

Volatile Compounds

RCL 8/12/85

Concentration: Low Medium (Circle One)

Date Extracted/Prepared: 7-1-85

Date Analyzed: 7-1-85

Conc/Dil Factor: 1 pH: –

Percent Moisture: –

Percent Moisture (Decanted): –

	CAS Number		ug/l or ug/Kg (Circle One)
[illegible]	74-87-3	Chloromethane	10 u
[illegible]	74-83-9	Bromomethane	10 u
[illegible]	75-01-4	Vinyl Chloride	10 u
[illegible]	75-00-3	Chloroethane	10 u
[illegible]	75-09-2	Methylene Chloride	10 u
	67-64-1	Acetone	25 u
	75-15-0	Carbon Disulfide	10 u
[illegible]	75-35-4	1, 1-Dichloroethene	10 u
13U	75-34-3	1, 1-Dichloroethane	10 u
[illegible]	156-60-5	Trans-1, 2-Dichloroethene	10 u
[illegible]	67-66-3	Chloroform	10 u
10U	107-06-2	1, 2-Dichloroethane	10 u
	78-93-3	2-Butanone	10 u
11U	71-55-6	1, 1, 1-Trichloroethane	10 u
6U	56-23-5	Carbon Tetrachloride	10 u
	108-05-4	Vinyl Acetate	10 u
48U	75-27-4	Bromodichloromethane	10 u

	CAS Number		ug/l or ug/Kg (Circle One)
15U	79-34-5	1, 1, 2, 2-Tetrachloroethane	10 u
37U	78-87-5	1, 2-Dichloropropane	10 u
33U	10061-02-6	Trans-1, 3-Dichloropropene	10 u
87U	79-01-6	Trichloroethene	10 u
51U	124-48-1	Dibromochloromethane	10 u
14U	79-00-5	1, 1, 2-Trichloroethane	10 u
4U	71-43-2	Benzene	10 u
	10061-01-5	cis-1, 3-Dichloropropene	10 u
19U	110-75-8	2-Chloroethylvinylether	10 u
47U	75-25-2	Bromoform	10 u
	591-78-6	2-Hexanone	10 u
	108-10-1	4-Methyl-2-Pentanone	10 u
85U	127-18-4	Tetrachloroethene	10 u
86U	108-88-3	Toluene	10 u
7U	108-90-7	Chlorobenzene	10 u
38U	100-41-4	Ethylbenzene	10 u
	100-42-5	Styrene	10 u
		Total Xylenes	10 u

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

Value If the result is a value greater than or equal to the detection limit, report the value.

U Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g. 10U) based on necessary concentration/dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read: U-Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.

J Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g. 10J).

C This flag applies to pesticide parameters where the identification has been confirmed by GC/MS. Single component pesticides ≥10 ng/ul in the final extract should be confirmed by GC/MS.

B This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

Other Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

K Indicates compound was detected and identified, but the concentration is below reporting detection limit.

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Environmental Protection Agency CLP Sample Management Office
P.O Box 818, Alexandria, Virginia 22313 703/557-2490

Sample Number
JA524

Organics Analysis Data Sheet
(Page 2)

REL
8/12/85

Semivolatile Compounds

Concentration: Low Medium (Circle One)

Date Extracted/Prepared: 7-9-85

Date Analyzed: 7-12-85

Conc/Dil Factor: 2

	CAS Number		ug/l or ug/Kg (Circle One)
61B	62-75-9	N-Nitrosodimethylamine	20 µ J
65A	108-95-2	Phenol	20 µ
	62-53-3	Aniline	20 µ
18B	111-44-4	bis(-2-Chloroethyl)Ether	20 µ
24A	95-57-8	2-Chlorophenol	20 µ
26B	541-73-1	1,3-Dichlorobenzene	20 µ
27B	106-46-7	1,4-Dichlorobenzene	20 µ
	100-51-6	Benzyl Alcohol	20 µ
25B	95-50-1	1,2-Dichlorobenzene	20 µ
	95-48-7	2-Methylphenol	20 µ
42B	39638-32-9	bis(2-chloroisopropyl)Ether	20 µ
	106-44-5	4-Methylphenol	20 µ
63B	621-64-7	N-Nitroso-Di-n-Propylamine	20 µ
12B	67-72-1	Hexachloroethane	20 µ
56B	98-95-3	Nitrobenzene	20 µ
54B	78-59-1	Isophorone	20 µ
57A	88-75-5	2-Nitrophenol	20 µ
34A	105-67-9	2,4-Dimethylphenol	20 µ
	65-85-0	Benzoic Acid	20 µ
43B	111-91-1	bis(-2-Chloroethoxy)Methane	20 µ
31A	120-83-2	2,4-Dichlorophenol	20 µ
8B	120-82-1	1,2,4-Trichlorobenzene	20 µ
55B	91-20-3	Naphthalene	20 µ
	106-47-8	4-Chloroaniline	20 µ
52B	87-68-3	Hexachlorobutadiene	20 µ
22A	59-50-7	4-Chloro-3-Methylphenol	20 µ
	91-57-6	2-Methylnaphthalene	20 µ
53B	77-47-4	Hexachlorocyclopentadiene	20 µ
21A	88-06-2	2,4,6-Trichlorophenol	20 µ
	95-95-4	2,4,5-Trichlorophenol	20 µ
20B	91-58-7	2-Chloronaphthalene	20 µ
	88-74-4	2-Nitroaniline	20 µ
71B	131-11-3	Dimethyl Phthalate	20 µ
77B	208-96-8	Acenaphthylene	20 µ
	99-09-2	3-Nitroaniline	20 µ

	CAS Number		ug/l or ug/Kg (Circle One)
1B	83-32-9	Acenaphthene	20 µ J
59A	51-28-5	2,4-Dinitrophenol	20 µ
58A	100-02-7	4-Nitrophenol	20 µ
	132-64-9	Dibenzofuran	20 µ
35B	121-14-2	2,4-Dinitrotoluene	20 µ
36B	606-20-2	2,6-Dinitrotoluene	20 µ
70B	84-66-2	Diethylphthalate	20 µ
40B	7005-72-3	4-Chlorophenyl-phenylether	20 µ
80B	86-73-7	Fluorene	20 µ
	100-01-6	4-Nitroaniline	20 µ
60A	534-52-1	4,6-Dinitro-2-Methylphenol	20 µ
62B	86-30-6	N-Nitrosodiphenylamine (1)	20 µ
41B	101-55-3	4-Bromophenyl-phenylether	20 µ
9B	118-74-1	Hexachlorobenzene	20 µ
64A	87-86-5	Pentachlorophenol	20 µ
81B	85-01-8	Phenanthrene	20 µ
78B	120-12-7	Anthracene	20 µ
68B	84-74-2	Di-n-Butylphthalate	20 µ
39B	206-44-0	Fluoranthene	20 µ
5B	92-87-5	Benzidine	20 µ
84B	129-00-0	Pyrene	20 µ
67B	85-68-7	Butylbenzylphthalate	20 µ
28B	91-94-1	3,3'-Dichlorobenzidine	20 µ
72B	56-55-3	Benzo(a)Anthracene	20 µ
66B	117-81-7	bis(2-Ethylhexyl)Phthalate	20 µ
76B	218-01-9	Chrysene	20 µ
69B	117-84-0	Di-n-Octyl Phthalate	20 µ
74B	205-99-2	Benzo(b)Fluoranthene	20 µ
75B	207-08-9	Benzo(k)Fluoranthene	20 µ
73B	50-32-8	Benzo(a)Pyrene	20 µ
83B	193-39-5	Indeno(1,2,3-cd)Pyrene	20 µ
82B	53-70-3	Dibenz(a,h)Anthracene	20 µ
79B	191-24-2	Benzo(g,h,i)Perylene	20 µ

(1)-Cannot be separated from diphenylamine

Environmental Protection Agency. CLP Sample Management Office.
P. O. Box 818, Alexandria, Virginia 22313 703/557-2490

Sample Number
JA 524

Organics Analysis Data Sheet
(Page 3)

RLP 8/12/85

Pesticide/PCBs

Concentration: Low Medium (Circle One)

Date Extracted/Prepared 6-25-85

Date Analyzed 7-3-85

Conc/Dil Factor: diL=1

	CAS Number		ug/l or ug/Kg (Circle One)
101P	319-84-6	Alpha-BHC	0.1 U
103P	319-85-7	Beta-BHC	0.1 U
104P	319-86-8	Delta-BHC	0.1 U
102P	58-89-9	Gamma-BHC (Lindane)	0.1 U
100P	76-44-8	Heptachlor	0.1 U
89P	309-00-2	Aldrin	0.1 U
101P	1024-57-3	Heptachlor Epoxide	0.1 U
	959-98-8	Endosulfan I	0.1 U
90P	60-57-1	Dieldrin	0.1 U
93P	72-55-9	4, 4'-DDE	0.1 U
98P	72-20-8	Endrin	0.1 U
	33213-65-9	Endosulfan II	0.1 U
94P	72-54-8	4, 4'-DDD	0.1 U
99P	7421-93-4	Endrin Aldehyde	0.1 U
97P	1031-07-8	Endosulfan Sulfate	0.1 U
92P	50-29-3	4, 4'-DDT	0.1 U
	72-43-5	Methoxychlor	0.2 U
	53494-70-5	Endrin Ketone	0.1 U
91P	57-74-9	Chlordane	0.2 U
113P	8001-35-2	Toxaphene	0.2 U
112P	12674-11-2	Aroclor-1016	0.2 U
108P	11104-28-2	Aroclor-1221	0.2 U
109P	11141-16-5	Aroclor-1232	0.2 U
106P	53469-21-9	Aroclor-1242	0.2 U
110P	12672-29-6	Aroclor-1248	0.2 U
107P	11097-69-1	Aroclor-1254	0.2 U
111P	11096-82-5	Aroclor-1260	0.2 U

V_i = Volume of extract injected (ul)

V_s = Volume of water extracted (ml)

W_s = Weight of sample extracted (g)

V_t = Volume of total extract (ul)

V_s 500 or W_s NA V_t 500 V_i 2.7

Environmental Protection Agency CLP Sample Management Office
P.O. Box 818, Alexandria, Virginia 22313 703/557-2490

Sample Number
JA524

Organics Analysis Data Sheet
(Page 2)

REL
8/12/85

Semivolatile Compounds

Concentration: Low Medium (Circle One)

Date Extracted/Prepared: 7-9-85

Date Analyzed 7-12-85

Conc/Dil Factor: 2

	CAS Number		ug/l or ug/Kg (Circle One)
61B	62-75-9	N-Nitrosodimethylamine	20 U J
65A	106-95-2	Phenol	20 U
	62-53-3	Aniline	20 U
18B	111-44-4	bis(-2-Chloroethyl)Ether	20 U
24A	95-57-8	2-Chlorophenol	20 U
26B	541-73-1	1,3-Dichlorobenzene	20 U
27B	106-46-7	1,4-Dichlorobenzene	20 U
	100-51-6	Benzyl Alcohol	20 U
25B	95-50-1	1,2-Dichlorobenzene	20 U
	95-48-7	2-Methylphenol	20 U
42B	39638-32-9	bis(2-chloroisopropyl)Ether	20 U
	106-44-5	4-Methylphenol	20 U
63B	621-64-7	N-Nitroso-Di-n-Propylamine	20 U
12B	67-72-1	Hexachloroethane	20 U
56B	98-95-3	Nitrobenzene	20 U
54B	78-59-1	Isophorone	20 U
57A	88-75-5	2-Nitrophenol	20 U
34A	105-67-9	2,4-Dimethylphenol	20 U
	65-85-0	Benzoic Acid	20 U
43B	111-91-1	bis(-2-Chloroethoxy)Methane	20 U
31A	120-83-2	2,4-Dichlorophenol	20 U
8B	120-82-1	1,2,4-Trichlorobenzene	20 U
55B	91-20-3	Naphthalene	20 U
	106-47-8	4-Chloroaniline	20 U
52B	87-68-3	Hexachlorobutadiene	20 U
22A	59-50-7	4-Chloro-3-Methylphenol	20 U
	91-57-6	2-Methylnaphthalene	20 U
53B	77-47-4	Hexachlorocyclopentadiene	20 U
21A	88-06-2	2,4,6-Trichlorophenol	20 U
	95-95-4	2,4,5-Trichlorophenol	20 U
20B	91-58-7	2-Chloronaphthalene	20 U
	88-74-4	2-Nitroaniline	20 U
71B	131-11-3	Dimethyl Phthalate	20 U
77B	208-96-8	Acenaphthylene	20 U
	99-09-2	3-Nitroaniline	20 U

	CAS Number		ug/l or ug/Kg (Circle One)
1B	83-32-9	Acenaphthene	20 U J
59A	51-28-5	2,4-Dinitrophenol	20 U
58A	100-02-7	4-Nitrophenol	20 U
	132-64-9	Dibenzofuran	20 U
35B	121-14-2	2,4-Dinitrotoluene	20 U
36B	606-20-2	2,6-Dinitrotoluene	20 U
70B	84-66-2	Diethylphthalate	20 U
40B	7005-72-3	4-Chlorophenyl-phenylether	20 U
80B	86-73-7	Fluorene	20 U
	100-01-6	4-Nitroaniline	20 U
60A	534-52-1	4,6-Dinitro-2-Methylphenol	20 U
62B	86-30-6	N-Nitrosodiphenylamine (1)	20 U
41B	101-55-3	4-Bromophenyl-phenylether	20 U
9B	118-74-1	Hexachlorobenzene	20 U
64A	87-86-5	Pentachlorophenol	20 U
81B	85-01-8	Phenanthrene	20 U
78B	120-12-7	Anthracene	20 U
68B	84-74-2	Di-n-Butylphthalate	20 U
39B	206-44-0	Fluoranthene	20 U
5B	92-87-5	Benzidine	20 U
84B	129-00-0	Pyrene	20 U
67B	85-68-7	Butylbenzylphthalate	20 U
28B	91-94-1	3,3'-Dichlorobenzidine	20 U
72B	56-55-3	Benzo(a)Anthracene	20 U
66B	117-81-7	bis(2-Ethylhexyl)Phthalate	20 U
76B	218-01-9	Chrysene	20 U
69B	117-84-0	Di-n-Octyl Phthalate	20 U
74B	205-99-2	Benzo(b)Fluoranthene	20 U
75B	207-08-9	Benzo(k)Fluoranthene	20 U
73B	50-32-8	Benzo(a)Pyrene	20 U
83B	193-39-5	Indeno(1,2,3-cd)Pyrene	20 U
82B	53-70-3	Dibenz(a,h)Anthracene	20 U
79B	191-24-2	Benzo(g,h,i)Perylene	20 U

(1)-Cannot be separated from diphenylamine

Environmental Protection Agency. CLP Sample Management Office.
P. O. Box 818, Alexandria, Virginia 22313 703/557-2490

Sample Number
JA 525

Organics Analysis Data Sheet
(Page 1)

Laboratory Name: ERCO/A Division of ENSECO
Lab Sample ID No: 17215
Sample Matrix: Water
Data Release Authorized By: JFM

Case No: 4565
QC Report No: 140
Contract No: 68-01-7027
Date Sample Received: 6/24/85

REL 8/12/85

Volatile Compounds

Concentration: Low Medium (Circle One)
Date Extracted/Prepared: 7/1/85
Date Analyzed: 7/1/85
Conc/Dil Factor: 1.0 pH —
Percent Moisture: —
Percent Moisture (Decanted): —

	CAS Number		ug/l or ug/Kg (Circle One)
45U	74-87-3	Chloromethane	10U
46U	74-83-9	Bromomethane	10U
88U	75-01-4	Vinyl Chloride	10U
16U	75-00-3	Chloroethane	10U
44U	75-09-2	Methylene Chloride	10U
	67-64-1	Acetone	25U
	75-15-0	Carbon Disulfide	10U
29U	75-35-4	1, 1-Dichloroethene	10U
13U	75-34-3	1, 1-Dichloroethane	10U
30U	156-60-5	Trans-1, 2-Dichloroethene	10U
23U	67-66-3	Chloroform	10U
10U	107-06-2	1, 2-Dichloroethane	10U
	78-93-3	2-Butanone	10U
11U	71-55-6	1, 1, 1-Trichloroethane	10U
6U	56-23-5	Carbon Tetrachloride	10U
	108-05-4	Vinyl Acetate	10U
48U	75-27-4	Bromodichloromethane	10U

	CAS Number		ug/l or ug/Kg (Circle One)
15U	79-34-5	1, 1, 2, 2-Tetrachloroethane	10U
32U	78-87-5	1, 2-Dichloropropane	10U
33U	10061-02-6	Trans-1, 3-Dichloropropene	10U
87U	79-01-6	Trichloroethene	10U
51U	124-48-1	Dibromochloromethane	10U
14U	79-00-5	1, 1, 2-Trichloroethane	10U
4U	71-43-2	Benzene	10U
	10061-01-5	cis-1, 3-Dichloropropene	10U
19U	110-75-8	2-Chloroethylvinylether	10U
47U	75-25-2	Bromoform	10U
	591-78-6	2-Hexanone	10U
	108-10-1	4-Methyl-2-Pentanone	10U
85U	127-18-4	Tetrachloroethene	10U
86U	108-88-3	Toluene	10U
7U	108-90-7	Chlorobenzene	10U
38U	100-41-4	Ethylbenzene	10U
	100-42-5	Styrene	10U
		Total Xylenes	10U

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

Value If the result is a value greater than or equal to the detection limit, report the value.

U Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g., 10U) based on necessary concentration/dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read: U-Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.

J Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but ...

C This flag applies to pesticide parameters where the identification has been confirmed by GC/MS. Single component pesticides ≥10 ng/ul in the final extract should be confirmed by GC/MS.

B This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

K Indicates compound was detected and identified, but the concentration is below reporting detection limit.

Environmental Protection Agency, CLP Sample Management Office
P O Box 818, Alexandria, Virginia 22313 703/557-2490

Sample Number
JA 524

Organics Analysis Data Sheet
(Page 3)

REI
8/12/85

Pesticide/PCBs

Concentration: Low Medium (Circle One)

Date Extracted/Prepared 6-25-85

Date Analyzed 7-3-85

Conc/Dil Factor: dil=1

	CAS Number		ug/l or ug/Kg (Circle One)
101P	319-84-6	Alpha-BHC	0.1 U
103P	319-85-7	Beta-BHC	0.1 U
104P	319-86-8	Delta-BHC	0.1 U
102P	58-89-9	Gamma-BHC (Lindane)	0.1 U
100P	76-44-8	Heptachlor	0.1 U
99P	309-00-2	Aldrin	0.1 U
101P	1024-57-3	Heptachlor Epoxide	0.1 U
	959-98-8	Endosulfan I	0.1 U
90P	60-57-1	Dieldrin	0.1 U
93P	72-55-9	4,4'-DDE	0.1 U
98P	72-20-8	Endrin	0.1 U
	33213-65-9	Endosulfan II	0.1 U
94P	72-54-8	4,4'-DDD	0.1 U
99P	7421-93-4	Endrin Aldehyde	0.1 U
97P	1031-07-8	Endosulfan Sulfate	0.1 U
92P	50-29-3	4,4'-DDT	0.1 U
	72-43-5	Methoxychlor	0.2 U
	53494-70-5	Endrin Ketone	0.1 U
91P	57-74-9	Chlordane	0.2 U
113P	8001-35-2	Toxaphene	0.2 U
112P	12674-11-2	Aroclor-1016	0.2 U
105P	11104-28-2	Aroclor-1221	0.2 U
109P	11141-16-5	Aroclor-1232	0.2 U
106P	53469-21-9	Aroclor-1242	0.2 U
110P	12672-29-6	Aroclor-1248	0.2 U
107P	11097-69-1	Aroclor-1254	0.2 U
111P	11096-82-5	Aroclor-1260	0.2 U

V_i = Volume of extract injected (ul)

V_s = Volume of water extracted (ml)

W_s = Weight of sample extracted (g)

V_t = Volume of total extract (ul)

V_s 500 or W_s NA V_t 500 V_i 2.7

4/84

Environmental Protection Agency. CLP Sample Management Office
P. O. Box 818, Alexandria, Virginia 22313 703/557-2490

Sample Number
JA526

Organics Analysis Data Sheet
(Page 2)

REF
8/12/85

Semivolatile Compounds

Concentration: Low Medium (Circle One)

Date Extracted/Prepared: 7-9-85

Date Analyzed: 7-12-85

Conc/Dil Factor: 2

	CAS Number		ug/l or ug/Kg (Circle One)
61B	62-75-9	N-Nitrosodimethylamine	20 μ T
65A	108-95-2	Phenol	20 μ
	62-53-3	Aniline	20 μ
18B	111-44-4	bis(-2-Chloroethyl)Ether	20 μ
24A	95-57-8	2-Chlorophenol	20 μ
26B	541-73-1	1,3-Dichlorobenzene	20 μ
27B	106-46-7	1,4-Dichlorobenzene	20 μ
	100-51-6	Benzyl Alcohol	20 μ
25B	95-50-1	1,2-Dichlorobenzene	20 μ
	95-48-7	2-Methylphenol	20 μ
42B	39638-32-9	bis(2-chloroisopropyl)Ether	20 μ
	106-44-5	4-Methylphenol	20 μ
63B	621-64-7	N-Nitroso-Di-n-Propylamine	20 μ
12B	67-72-1	Hexachloroethane	20 μ
56B	98-95-3	Nitrobenzene	20 μ
54B	78-59-1	Isophorone	20 μ
57A	88-75-5	2-Nitrophenol	20 μ
34A	105-67-9	2,4-Dimethylphenol	20 μ
	65-85-0	Benzoic Acid	20 μ
43B	111-91-1	bis(-2-Chloroethoxy)Methane	20 μ
31A	120-83-2	2,4-Dichlorophenol	20 μ
8B	120-82-1	1,2,4-Trichlorobenzene	20 μ
55B	91-20-3	Naphthalene	20 μ
	106-47-8	4-Chloroaniline	20 μ
52B	87-68-3	Hexachlorobutadiene	20 μ
22A	59-50-7	4-Chloro-3-Methylphenol	20 μ
	91-57-6	2-Methylnaphthalene	20 μ
53B	77-47-4	Hexachlorocyclopentadiene	20 μ
21A	88-06-2	2,4,6-Trichlorophenol	20 μ
	95-95-4	2,4,5-Trichlorophenol	20 μ
20B	91-58-7	2-Chloronaphthalene	20 μ
	88-74-4	2-Nitroaniline	20 μ
71B	131-11-3	Dimethyl Phthalate	20 μ
77B	208-96-8	Acenaphthylene	20 μ
	99-09-2	3-Nitroaniline	20 μ
1B	83-32-9	Acenaphthene	20 μ T
59A	51-28-5	2,4-Dinitrophenol	20 μ
58A	100-02-7	4-Nitrophenol	20 μ
	132-64-9	Dibenzofuran	20 μ
35B	121-14-2	2,4-Dinitrotoluene	20 μ
36B	606-20-2	2,6-Dinitrotoluene	20 μ
70B	84-66-2	Diethylphthalate	20 μ
40B	7005-72-3	4-Chlorophenyl-phenylether	20 μ
80B	86-73-7	Fluorene	20 μ
	100-01-6	4-Nitroaniline	20 μ
60A	534-52-1	4,6-Dinitro-2-Methylphenol	20 μ
62B	86-30-6	N-Nitrosodiphenylamine (1)	20 μ
41B	101-55-3	4-Bromophenyl-phenylether	20 μ
9B	118-74-1	Hexachlorobenzene	20 μ
64A	87-86-5	Pentachlorophenol	20 μ
81B	85-01-8	Phenanthrene	20 μ
78B	120-12-7	Anthracene	20 μ
68B	84-74-2	Di-n-Butylphthalate	20 μ
39B	206-44-0	Fluoranthene	20 μ
5B	92-87-5	Benzidine	20 μ
84B	129-00-0	Pyrene	20 μ
67B	85-68-7	Butylbenzylphthalate	20 μ
28B	91-94-1	3,3'-Dichlorobenzidine	20 μ
72B	56-55-3	Benzo(a)Anthracene	20 μ
66B	117-81-7	bis(2-Ethylhexyl)Phthalate	20 μ
76B	218-01-9	Chrysene	20 μ
69B	117-84-0	Di-n-Octyl Phthalate	20 μ
74B	205-99-2	Benzo(b)Fluoranthene	20 μ
75B	207-08-9	Benzo(k)Fluoranthene	20 μ
73B	50-32-8	Benzo(a)Pyrene	20 μ
83B	193-39-5	Indeno(1,2,3-cd)Pyrene	20 μ
82B	53-70-3	Dibenz(a,h)Anthracene	20 μ
79B	191-24-2	Benzo(g,h,i)Perylene	20 μ

(1)-Cannot be separated from diphenylamine

4/84

Environmental ... P. O. Box 818 Alexandria Virginia 22313 703/557-2490

JA526

Organics Analysis Data Sheet
(Page 1)

Laboratory Name ERCO/A Division of ENSECO

Case No 4565

Lab Sample ID No 17209

QC Report No 140

Sample Matrix: Water

Contract No 68-01-7027

Data Release Authorized By JFM

Date Sample Received 6-24-85

REL 8/12/85

Volatile Compounds

Concentration: Low Medium (Circle One)

Date Extracted/Prepared 7-1-85

Date Analyzed 7-1-85

Conc/Dil Factor: 1 pH –

Percent Moisture –

Percent Moisture (Decanted) –

CAS Number		ug/l or ug/Kg (Circle One)
74-87-3	Chloromethane	10 U
74-83-9	Bromomethane	10 U
75-01-4	Vinyl Chloride	10 U
75-00-3	Chloroethane	10 U
75-09-2	Methylene Chloride	10 U
67-64-1	Acetone	25 U
75-15-0	Carbon Disulfide	10 U
75-35-4	1, 1-Dichloroethene	10 U
75-34-3	1, 1-Dichloroethane	10 U
156-60-5	Trans-1, 2-Dichloroethene	10 U
67-66-3	Chloroform	10 U
107-06-2	1, 2-Dichloroethane	10 U
78-93-3	2-Butanone	10 U
71-55-6	1, 1, 1-Trichloroethane	10 U
56-23-5	Carbon Tetrachloride	10 U
108-05-4	Vinyl Acetate	10 U
75-27-4	Bromodichloromethane	10 U

CAS Number		ug/l or ug/Kg (Circle One)
79-34-5	1, 1, 2, 2-Tetrachloroethane	10 U
78-87-5	1, 2-Dichloropropane	10 U
10061-02-6	Trans-1, 3-Dichloropropene	10 U
79-01-6	Trichloroethene	10 U
124-48-1	Dibromochloromethane	10 U
79-00-5	1, 1, 2-Trichloroethane	10 U
71-43-2	Benzene	10 U
10061-01-5	cis 1, 3-Dichloropropene	10 U
110-75-8	2-Chloroethylvinylether	10 U
75-25-2	Bromoform	10 U
591-78-6	2-Hexanone	10 U
108-10-1	4-Methyl-2-Pentanone	10 U
127-18-4	Tetrachloroethene	10 U
108-88-3	Toluene	10 U
108-90-7	Chlorobenzene	10 U
100-41-4	Ethylbenzene	10 U
100-42-5	Styrene	10 U
	Total Xylenes	10 U

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

Value If the result is a value greater than or equal to the detection limit, report the value.

U Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g. 10U) based on necessary concentration/dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read: U-Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.

J Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g. 10J).

C This flag applies to pesticide parameters where the identification has been confirmed by GC/MS. Single component pesticides ≥10 ng/ul in the final extract should be confirmed by GC/MS.

B This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

Other Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

K Indicates compound was detected and identified, but the concentration is below reporting detection limit.

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Environmental Protection Agency. CLP Sample Management Office.
P. O. Box 818, Alexandria Virginia 22313 703/557-2490

Sample Number
JA 525

Organics Analysis Data Sheet
(Page 3)

AEL 8/12/85

Pesticide/PCBs

Concentration: Low Medium (Circle One)

Date Extracted/Prepared 6-24-85

Date Analyzed 7-3-85

Conc/Dil Factor: dil=1

	CAS Number		ug/l or ug/Kg (Circle One)
102P	319-84-6	Alpha-BHC	0.1 U
103P	319-85-7	Beta-BHC	0.1 U
104P	319-86-8	Delta-BHC	0.1 U
105P	58-89-9	Gamma-BHC (Lindane)	0.1 U
100P	76-44-8	Heptachlor	0.1 U
89P	309-00-2	Aldrin	0.1 U
101P	1024-57-3	Heptachlor Epoxide	0.1 U
	959-98-8	Endosulfan I	0.1 U
90P	60-57-1	Dieldrin	0.1 U
93P	72-55-9	4,4'-DDE	0.1 U
98P	72-20-8	Endrin	0.1 U
	33213-65-9	Endosulfan II	0.1 U
94P	72-54-8	4,4'-DDD	0.1 U
99P	7421-93-4	Endrin Aldehyde	0.1 U
97P	1031-07-8	Endosulfan Sulfate	0.1 U
92P	50-29-3	4,4'-DDT	0.1 U
	72-43-5	Methoxychlor	0.2 U
	53494-70-5	Endrin Ketone	0.1 U
91P	57-74-9	Chlordane	0.2 U
113P	8001-35-2	Toxaphene	0.2 U
112P	12674-11-2	Aroclor-1016	0.2 U
108P	11104-28-2	Aroclor-1221	0.2 U
109P	11141-16-5	Aroclor-1232	0.2 U
106P	53469-21-9	Aroclor-1242	0.2 U
110P	12672-29-6	Aroclor-1248	0.2 U
107P	11097-69-1	Aroclor-1254	0.2 U
111P	11096-82-5	Aroclor-1260	0.2 U

V_i = Volume of extract injected (ul)

V_s = Volume of water extracted (ml)

W_s = Weight of sample extracted (g)

V_t = Volume of total extract (ul)

V_s 500 or W_s NA V_t 500 V_i 2.7

Form I

Environmental Protection Agency   CLP Sample Management Office
P.O. Box 818   Alexandria, Virginia 22313   703/557-2490

Sample Number
JA525

Organics Analysis Data Sheet
(Page 2)

RE1
8/12/85

Semivolatile Compounds

Concentration: Low   Medium   (Circle One)

Date Extracted/Prepared: 7-9-85

Date Analyzed: 7-11-85

Conc/Dil Factor: 5

	CAS Number		ug/l or ug/Kg (Circle One)
B	62-75-9	N-Nitrosodimethylamine	50 μ J
A	108-95-2	Phenol	50 μ
	62-53-3	Aniline	50 μ
B	111-44-4	bis(-2-Chloroethyl)Ether	50 μ
A	95-57-8	2-Chlorophenol	50 μ
26B	541-73-1	1,3-Dichlorobenzene	50 μ
B	106-46-7	1,4-Dichlorobenzene	50 μ
	100-51-6	Benzyl Alcohol	50 μ
25B	95-50-1	1,2-Dichlorobenzene	50 μ
	95-48-7	2-Methylphenol	50 μ
B	39638-32-9	bis(2-chloroisopropyl)Ether	50 μ
	106-44-5	4-Methylphenol	50 μ
B	621-64-7	N-Nitroso-Di-n-Propylamine	50 μ
B	67-72-1	Hexachloroethane	50 μ
56B	98-95-3	Nitrobenzene	50 μ
B	78-59-1	Isophorone	50 μ
A	88-75-5	2-Nitrophenol	50 μ
34A	105-67-9	2,4-Dimethylphenol	50 μ
	65-85-0	Benzoic Acid	50 μ
3B	111-91-1	bis(-2-Chloroethoxy)Methane	50 μ
31A	120-83-2	2,4-Dichlorophenol	50 μ
B	120-82-1	1,2,4-Trichlorobenzene	50 μ
55B	91-20-3	Naphthalene	50 μ
	106-47-8	4-Chloroaniline	50 μ
B	87-68-3	Hexachlorobutadiene	50 μ
A	59-50-7	4-Chloro-3-Methylphenol	50 μ
	91-57-6	2-Methylnaphthalene	50 μ
53B	77-47-4	Hexachlorocyclopentadiene	50 μ
21A	88-06-2	2,4,6-Trichlorophenol	50 μ
	95-95-4	2,4,5-Trichlorophenol	50 μ
20B	91-58-7	2-Chloronaphthalene	50 μ
	88-74-4	2-Nitroaniline	50 μ
71B	131-11-3	Dimethyl Phthalate	50 μ
77B	208-96-8	Acenaphthylene	50 μ
	99-09-2	3-Nitroaniline	50 μ

	CAS Number		ug/l or ug/Kg (Circle One)
1B	83-32-9	Acenaphthene	50 μ J
59A	51-28-5	2,4-Dinitrophenol	50 μ
58A	100-02-7	4-Nitrophenol	50 μ
	132-64-9	Dibenzofuran	50 μ
35B	121-14-2	2,4-Dinitrotoluene	50 μ
36B	606-20-2	2,6-Dinitrotoluene	50 μ
70B	84-66-2	Diethylphthalate	50 μ
40B	7005-72-3	4-Chlorophenyl-phenylether	50 μ
80B	86-73-7	Fluorene	50 μ
	100-01-6	4-Nitroaniline	50 μ
60A	534-52-1	4,6-Dinitro-2-Methylphenol	50 μ
62B	86-30-6	N-Nitrosodiphenylamine (1)	50 μ
41B	101-55-3	4-Bromophenyl-phenylether	50 μ
9B	118-74-1	Hexachlorobenzene	50 μ
64A	87-86-5	Pentachlorophenol	50 μ
81B	85-01-8	Phenanthrene	50 μ
78B	120-12-7	Anthracene	50 μ
68B	84-74-2	Di-n-Butylphthalate	50 μ
39B	206-44-0	Fluoranthene	50 μ
5B	92-87-5	Benzidine	50 μ
84B	129-00-0	Pyrene	50 μ
67B	85-68-7	Butylbenzylphthalate	50 μ
28B	91-94-1	3,3'-Dichlorobenzidine	50 μ
72B	56-55-3	Benzo(a)Anthracene	50 μ
66B	117-81-7	bis(2-Ethylhexyl)Phthalate	bk
76B	218-01-9	Chrysene	50 μ
69B	117-84-0	Di-n-Octyl Phthalate	50 μ
74B	205-99-2	Benzo(b)Fluoranthene	50 μ
75B	207-08-9	Benzo(k)Fluoranthene	50 μ
73B	50-32-8	Benzo(a)Pyrene	50 μ
83B	193-39-5	Indeno(1,2,3-cd)Pyrene	50 μ
82B	53-70-3	Dibenz(a,h)Anthracene	50
79B	191-24-2	Benzo(g,h,i)Perylene	5

(1)-Cannot be separated from diphenylamine

APPENDIX P

REPORT OF ANALYSES
BENLAB - 1986

BENLAB Since 1913

Bennett Laboratories, Inc., a subsidiary of Bencorp, Inc
901 SOUTH 9th STREET • P.O. BOX 5816 • TACOMA, WASH. 98405 • (206) 272-4507 SEATTLE 624-0570/TELEX 152556SEA

DRAFT
=======

REPORT OF ANALYSIS

TC-86-8380

AUGUST 22, 1986

REQUESTED BY:

Mr. Thomas R. Anderson, President
Tacoma Industrial Properties, Inc.
C S 2259, 1123 Port of Tacoma Road
Tacoma, WA 98411

ANALYSIS REQUESTED:

Perform suplemental sampling and analysis of material rsidues in and around the building formerly occupied by the Griffin Wheel Co. to determine the extent of lead and other heavy heavy metals which were reportedly used in the foundry and fabrication processes of the company during its years of operation at the site.

CONDITIONS NOTED AND DISCUSSED:

Based on several meetings with the requestor and a previous overall reconisance study performed by Earth Consultants and Bennett Laboratories, primarily on the exterior of the Griffin Wheel buildings, and the general twelve acre property site, it was determined that a further study of the foundry building would be the appropriate next step in determining the extent of the contamination.

INVESTIGATION, RESEARCH AND ANALYSIS PERFORMED:

1. After careful inspection of the buildings for hazards which might be encountered in sampling, Messrs. George Schonhard and Bruce Chenoweth of Bennett Laboratories proceeded to the site for sampling and photographic documentation of the sample locations on August 6,1986.

2. A total of 23 samples of material residues were taken from various locations throughout the buildings and suspect areas outside the main building.

3. After completion of the sampling and documentation, the samples were returned to the laboratory for analysis.

4. Analyses performed were:

Initial:

a. Lead (pb) by the total digestion method

b. Asbestos (by phase contrast optical microscopy)

Secondary:

a. After reviewing the results for lead, it was determined that a portion (10 samples) of the group should be analyzed for all the heavy metals plus antimony and bismuth, two of the common components of the "Babbitt metal" bearing alloys which were reportedly produced in the Griffin Wheel plant.

5. The results of the above analyses are tabulated in Attachment 1 of this report.

6. The description of the sample locations is included as attachment 2 of this report.

7. A locater drawing which documents the sample locations in the buildings ant the immediate surrounding area is included as attachment 3.

8. Photographs documenting the samples and their specific locations are included as attachment 4.

DISCUSSION OF RESULTS AND CONCLUSIONS:

1. No asbestos was found in the samples.

2. The lead values found on material residues which appeared to have been in the building for many years such as storage bins, deep floor crusted layers, and deposits on the rafters ranged from 2600 to 129,000 parts per million (ppm).

3. The highest lead values were found on the ground surface outside the west wall of the building, and also the wall scrapings from southwest side of the building. These contained 258,000 ppm (25.8%) and 196,000 ppm (19.6 %) respectively.

4. The supplemental analyses for the remaining heavy metals, plus Antimony and Bismuth, clearly indicate that the material residue samples reflect the normal process metals which would be used in the type of operation conducted at the Griffin Wheel Company.

BENNETT LABORATORIES, INC.

M. E. Lough
Chairman

Attachments: 4

REPORT OF ANALYSIS
ATTACHMENT I
RESULTS ARE INDICATED IN PARTS PER MILLION

SAMPLE ID	LEAD	ARSENIC	BARIUM	CADMIUM	CHROMIUM	SELENIUM	SILVER	ANTIMONY	GISMUTH
A-1*	129,000	6	46	12	157	<1	10	290	103
A-2	18,000								
A-3*	89,000	8	130	17	206	<1	5	360	63
A-4	81,000								
A-5	2,600								
A-6									
A-7	79,000								
A-8	85,000								
A-9*	113,000	7	74	37	239	2	5	230	88
A-10	60								
A-11*	62,500	10	42	23	158	5	9	320	61
A-12	430								
A-13*	36,300	4	52	10	59	<1	7	110	96
A-14	21,500								
A-15	17,500								
A-16	2,600								
A-17	8,000								
A-18*	196,000	4	52	3	10	<1	9	300	152
A-19*	258,000	2	5	51	51	<1	8	120	197

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SAMPLE ID	LEAD	ARSENIC	BARIUM	CADMIUN	CHROMIUM	SELENIUM	SILVER	ANTIMONY	GISMUTH
A-20	98,000								
A-21*	24,000	12	27	35	97	4	14	110	16
A-22*	73,000	3	16	53	101	<1	9	170	70
A-23*	27,300	16	90	28	168	2	5	130	19

* Samples that were selected for additional metals analysis.

Kennedy/Jenks/Chilton